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# MANAGEMENT AND PARTICIPATION

In Irrigation Farmers' Organization

In Sone Command Area (Bihar)

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LUCKNOW

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MANAGEMENT AND PARTICIPATION IN IRRIGATION FARMERS'  
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GIRI INSTITUTE OF DEVELOPMENT STUDIES  
LUCKNOW

June 1982

## PREFACE

The study was initiated when I was on the Faculty of ANS Institute of Social Studies, Patna, as a part of small budget studies financed by the Institute. However, I moved to Giri Institute of Development Studies, Lucknow while the data collection was still in process. Luckily Giri Institute had funds which could enable me to complete the study. The total finances involved in the research (including the contribution of ANS Institute) were less than Rs.4500 and the major portion of the fund was spent in the salary of Mr. R.K. Verma, who joined the research project in the capacity of a Research Assistant. However, as the work advanced, I decided to share the authorship with Mr. Verma with a view to encourage him to work with greater personal involvement in the project and to sustain his interest in research. The study should have been completed earlier, and was in fact ready by October 1981. However, on account of certain gaps in the data, Mr. Verma had to make a re-visit to two of the three field areas in March, 1982 and the gaps were bridged.

The cooperation of a large number of informants - cultivators, their representatives and officials was responsible for the completion of this study. I and Mr. Verma express our thanks to all of them. Typing of the report was done by Mr. P.J. Devassykutty and Mr. Subhashis Mukherjee. Our thanks are to both of them.

Lucknow  
14 June 1982

NIRANJAN PANT

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## CHAPTER I

### INTRODUCTION

Development of irrigation and improvement of irrigation systems, both at macro and micro levels, are crucial to India's agricultural development. For promoting technologically superior agriculture, based on the use of modern inputs and aimed at raising crop productivity, availability of irrigation is the first and foremost prerequisite. Water is the most important single requirement for the growth of plants. Rainfall in most part of country is confined mainly to the four rainy months of June to September. During the remaining months the water requirements have to be met from ground and surface water resources. The need of applying irrigation for raising crops during non-rainy periods or when rains failed was felt even in the distant past. Artificial irrigation was practiced in India as far back as fourth millennium B.C.<sup>1</sup>

The importance of irrigation in raising the productivity of crops can be understood by the fact that nearly 25% of the total cropped area in the country is irrigated by various sources, and the balance continues to depend on rains and although rainfed areas account for 75% of the cropped area, their contribution amounts to only about 42% of total foodgrain production.<sup>2</sup>

Since the beginning of plan era, up to 1980-81, a total irrigation potential of 36.47 million hectares has been created in the country through major, medium and minor irrigation projects.<sup>3</sup> Of this, major and medium irrigation accounted for



17.87 million hectares and minor irrigation 18.60 million hectares. The total outlay on these works was of the order of Rs.11,544.71 crores, consisting of Rs.8,749.85 crores(75.80%) in major and medium and Rs.2,794.86 crores(24.20%) in minor irrigation projects (see table 1.1). This indicates an inverse relationship between the outlay and the irrigation potential created in two groups. Further, inspite of large investment made in the irrigation sector and the phenomenal growth of irrigation during the past 30 years, the return from the investment both in terms of yield as well as finance are very disappointing. Irrigated land should yield at least 4 to 5 tonnes of grain per hectare per year. However, at present it is hardly 1.7 tonnes on an average.<sup>4</sup>

Not only there is an unsatisfactory performance of irrigation in terms of productivity of crop but also poor utilization of the irrigation potential created through major and medium schemes. This is evident from the figures in the table 1.1 which show a full utilization in case of minor irrigation (includes ground water) but a constant gap in the utilization of created potential in case of major and medium irrigation which increases to about 4 million hectares by the end of 1979-80.

Concerned by this gap in the utilization of created potential, the Government of India in 1973 initiated the idea of Command Area Development (CAD) in case of large scale gravity irrigation projects. By 1978-79, 38 CADAs established, covering 50 irrigation projects located in 13 states and spanning over

Table 1.1  
Outlay on Development of Irrigation Potential

Period	Outlay/Expenditure (Rs. crores)			Irrigation Potential (million Hectares)		
	Major & Minor Medium Irriga- tion	Minor Irriga- tion	Total	Major & Minor Medium Irriga- tion	Minor Irriga- tion	Total
1	2	3	4	5	6	7
Pre-Plan Benefits	-	-	-	9.7 (42.92)	12.9 (57.08)	22.60 (100.00)
First Plan	380.0 (83.33)	76.0 (16.67)	456.0 (100.00)	2.5 (68.31)	1.16 (31.69)	3.66 (100.00)
Second Plan	380.0 (72.80)	142.0 (27.20)	522.0 (100.00)	2.1 (74.20)	0.73 (25.80)	2.83 (100.00)
Third Plan	581.0 (63.92)	328.0 (36.08)	909.0 (100.00)	2.3 (50.88)	2.22 (49.12)	4.52 (100.00)
Annual Plan (1966-1969)	434.0 (57.11)	326.0 (42.89)	760.0 (100.00)	1.5 (42.93)	1.99 (57.02)	3.49 (100.00)
Fourth Plan (1969-1974)	1237.0 (70.69)	513.0 (29.31)	1750.0 (100.00)	2.6 (36.62)	4.50 (63.38)	7.10 (100.00)
Fifth Plan (1974-1978)	2442.0 (79.47)	631.0 (20.53)	3073.0 (100.00)	4.12 (52.02)	3.80 (47.98)	7.92 (100.00)
Annual Plan (1978-1979)	977.0 (80.58)	237.0 (19.52)	1214.0 (100.00)	1.04 (44.44)	1.30 (55.56)	2.34 (100.00)
Annual Plan (1979-80)	1079.0 (80.58)	260.0 (19.42)	1339.0 (100.00)	0.74 (34.58)	1.40 (65.42)	2.14 (100.00)
Annual Plan (1980-1981)	1239.85 (81.48)	281.86 (18.52)	1521.71 (100.00)	0.97 (39.27)	1.50 (60.73)	2.47 (100.00)
TOTAL	8749.85 (75.80)	2794.86 (24.20)	11544.71 (100.00)	17.87* (49.00)	18.60* (51.00)	36.47* (100.00)

Source : Sixth Five Year Plan 1980-85 p.148 and Annual Plan 1980-81 (p.41), Planning Commission, Government of India.

Notes : Figures in parentheses indicate percentages.

\*Excludes pre-Plan irrigation potential.

106 districts with an ultimate potential of about 12.8 million hectares.<sup>5</sup> However, according to a statement of the Union Minister of State for irrigation in Lok Sabha on November 18, 1980, 44 CADAs have been set up, covering 71 irrigation projects all over the country.

The three main objectives of CAD programme were, greater utilization of irrigation potential, greater productivity of crop and a more equitable distribution of water among the beneficiary farmers in the command. For the fulfilment of these objectives, a three pronged approach consisting of integrated area development, improvement of water delivery system below the outlet and the involvement of beneficiary farmers in the management of the water, particularly below the outlet, was envisaged.

The emphasis on farmers involvement was laid because it was realised that unless farmers themselves participated in the management of the water at the local level the efforts of the government in obtaining the objectives of the CAD programme would not be achieved. Further, evidence in the South and South East Asia clearly demonstrated that the countries where farmers were actively associated with the irrigation development had acquired considerable amount of success compared to the countries where irrigation development was left in the hands of state bureaucracy. The acceptance of the farmers participation as a pragmatic solution rather than a value has been on account of a realization that the irrigation projects with their complex engineering and bureaucratic organization can not be successful unless the



Table 1.2

Irrigation potential & utilisation 1950-80

Item	Ultimate Irrigation Potential	(million ha.)					
		1950-51		1977-78		1979-80	
		Pot.	Utl.	Pot.	Utl.	Pot.	Utl.
1	2	3	4	5	6	7	8
1. Surface water	73.5	16.1	16.1	32.3	28.7	34.6	30.6
a. Major & Medium	58.5	9.7	9.7	24.8	21.2	26.6	22.6
b. Minor	15.0	6.4	6.4	7.5	7.5	8.0	8.0
2. Ground water	40.0	6.5	6.5	19.8	19.8	22.0	22.0
Total	113.5	22.6	22.6	52.1	48.5	56.6	52.6

Source : Sixth Five Year Plan, 1980-85, Government of India, Planning Commission, p.148.

beneficiary farmers actively participate in the water management process. The findings of various scholars all over the world have shown that local collective organizations have been very effective in managing distribution of water, maintenance of irrigation structures, and resolution of conflicts at the local level (This aspect has been discussed in chapter II).

Keeping in mind the high importance attached to the farmer organizations, we envisaged a study of the management and participation in farmers organizations. The first step in this direction was to identify a large scale irrigation system where farmer organizations had been established. Since we were based

in Patna at the time the study was initiated, it was more pragmatic to confine our choice in Bihar. There are four large scale irrigation systems namely, Kosi, Sone, Gandak and Kiual chandan Badna in Bihar. We decided to study the Sone irrigation system because it was one of the largest and oldest irrigation systems in Bihar. The research objectives which were set and the methodology adopted for the collection of data were as follows.

### Research Objectives

1. To study the structure of organisation through which farmers participate in the water management process and to enquire whether these organisations are indigenous, voluntary or induced in terms of their origin.
2. To enquire about the mechanism adopted for the distribution of water, maintenance of canal networks, resolution of conflicts and interaction with the administrative set-up.
3. To identify the beneficiaries and to examine the socio-economic groupings of the local area they represent in terms of distribution of irrigation benefits.
4. To investigate the impact of these organizations on agricultural production and crop productivity in the area under the jurisdiction of these organisations.
5. To examine the possible role of the farmers' organisations at one or more levels, the size of participative group and also functions which could be effectively performed at each of these levels.
6. To find out the utility of these organisations in terms of effective implementation of the policy decisions like, strict enforcement of rotation system of water distribution and cropping pattern.

### Sources and Methods of Data Collection

To obtain the above mentioned objectives the data were collected both from primary and secondary sources. In case of primary sources, a survey of the farmers was conducted in two

chaks in Tarwan and Telpa villages in Naubatpur and Bikram blocks of Patna district. A third chak in Kurup village in Rohtas district was studied in considerable detail but no farmers' survey could be carried out there because of paucity of funds. In addition, unstructured depth interviews were conducted with officials, beneficiaries and representatives of the farmers. The various aspects of the study were talked and discussed with all such informants, officials as well as public, who could give useful information on the subject. During the field visits, the authors of the report took note of all those aspects which had a bearing on the study.

In case of secondary sources, the data was collected from various kinds of published and unpublished material. The use of various official documents and reports was made and the proceedings of meetings and committees were studied.

The data collection was done in two phases, first, during February-April, 1981, a preliminary investigation was made in case of Tarwan Irrigation Chak Society while in the second phase during October-December, 1981, two other societies, namely Telpa and Karup were studied and a survey of farmers in Tarwan and Telpa was conducted. To bridge the gaps and update the data a field visit was carried out by one of the authors in March, 1982.

#### Sone Irrigation System<sup>6</sup>

In early 19th century Francis Buchanan had visited (1911-1812) the part of the area (then known as district of Bihar and Patna) and focussed on the existence of well maintained



irrigation system. He has described various sources of irrigation such as canals, rivers, wells and reservoirs and has mentioned various devices of fetching water from wells, canals and reservoirs. Irrigation that time was in practice for both Kharif and Rabi crops. He said, "both canals and reservoirs contain also so considerable a supply, that they enable the farmer not only to bring the crop of rice to maturity, but, by means of above mentioned (manual water lifts), enable him to gear a winter crop of wheat, barley, and C".<sup>7</sup> With regard to maintenance he points out, "the expenses both of making and repairing the canals and reservoirs is entirely defrayed by the Zamindars who appoint proper persons to divide the water among the tenantry".<sup>8</sup>

The idea of constructing Sone Canal originated in 1853 as a safe-guard against famine with late colonel C.H. Dickens. The project was undertaken by the East India Irrigation and canal company but the Government took over it in 1868 and the work was started in the following year. The project was ultimately completed in the year 1879.<sup>9</sup>

"The system derives its supply from an anicut across the Sone at Dehri, and the general plan of the work comprise a main western canal, branching off from it on the left bank and a main eastern canal branching off on the right. The anicut or weir, which is 12,469 feet long, consists of a mass of rubble stone laid to a uniform slope and stiffened by walls of masonry founded on shallow wells. Twenty scouring sluices are provided

at either flank; and these are fitted with gates which can be opened or closed at any state of the river other than high flood. By means of these gates the level of the water in the pool above the weir can be kept at the height required to feed the canals"<sup>10</sup> The length of the anicut is nearly 4 k.m. and that of Western and Eastern Main Canals 20 k.m. and 11 k.m. respectively. Two navigation canals, the Buxar and Arrah canals take off from the Western Main canal while the Patna canal takes off from the Eastern canal. The two main canals with a full supply capacity of 130.3 cusecs and 73.6 cusecs respectively command an area of nearly 0.6 million hectares. The annual irrigation is to the tune of 0.35 million hectares.<sup>11</sup>

A new plan for the development of the 100 years old Sone canal system was taken up in early sixties consisting of three types of works, namely: (I) remodelling of the old Sone canal system; (II) construction of Sone barrage and link canals; and (III) construction of Sone high level canals. The remodelling of old Sone canal system was completed in 1965-66. Under the remodelling scheme, discharge in the Main Western Canal was increased from 4600 cusecs to 6600 cusecs and the Main Eastern Canal from 2600 cusecs to 300 cusecs. The construction work of the Sone barrage at Indrapuri in replacement of the out moded anicut at Dehri (8 Km.up-stream from Dehri Anicut) was taken up in 1962 and completed in 1965. The link canals on both sides were completed in 1967-68 and came in operation in March 1968. The construction of high level canals taking off from eastern and western link canals was started in 1969 and were to be

completed by 1976-77 but were still under construction till March 1979.

The old Sone canal system before remodelling used to extend irrigation to about 297 thousand hectares, viz, 240 thousand hectares in Kharif, 45 thousand in rabi and 12 thousand hectares in hot weather. About 75 per cent of the irrigation lay in Shahabad (now split in two districts as Bhojpur and Rohtas), 11 per cent in Gaya (now partly in Aurangabad and partly in Gaya) and 14 per cent in Patna district.<sup>12</sup> After remodelling, an additional area of 125 thousand hectares was expected to be irrigated. Therefore, the total area which was to be irrigated after remodelling was 422 thousand hectares, viz, 308 thousand hectares in Kharif, 62 thousand hectares in rabi and 52 thousand hectares in hot weather.<sup>13</sup> However the actual area irrigated by old canal system is much more than the envisaged during the last 12 years. The area irrigated in different years before and after remodelling of the old Sone canal system are shown in table 1.3.

The proposed irrigation potential of the Sone High Level Canals is 161 thousand hectare, of which 71 thousand hectares falls in Rohtas district and 90 thousand hectares in Aurangabad and Gaya. The irrigation potential actually created and utilized by the end of different years are shown in table 1.4.

Table 1.3  
Area Irrigated by Old Sone Canal System  
('000 hectares)

Year	Hot Weather	Kharif	Rabi	Total
1955-56	7.69	231.20	33.20	272.09
1960-61	0.41	261.53	34.00	295.95
1965-66	12.14	293.52	142.51	448.17
1968-69	33.60	304.04	198.38	536.02
1969-70	25.10	303.64	198.38	527.12
1970-71	19.10	302.42	221.45	542.89
1971-72	21.45	303.23	170.58	494.26
1972-73	18.21	300.40	174.08	492.69
1973-74	13.00	320.98	144.34	478.32
1974-75	9.20	328.65	145.63	483.48
1975-76	9.20	288.02	236.74	533.96
1976-77	-	339.93	242.81	582.74
1977-78	-	335.00	240.00	575.00
1978-79	15.68	341.20	221.34	578.20

Source : Sone CADA, Patna, Annual Progress Report  
1978-79, p.28.

Table 1.4  
Irrigation Potential Created and Utilized  
in Sone High Level Canals

Year	Irrigation potential by the end of the year		Potential Utilized	Percentage of Utilization
	Proposed	Created	Rabi-Kharif	
1973-74	72.85	72.85	36.01	49.43
1974-75	90.00	90.00	53.06	58.96
1975-76	110.00	110.00	60.42	54.93
1976-77	145.00	140.00	72.72	51.94
1977-78	161.00(Max)	156.00	79.63	53.09
1978-79	161.00(Max)	156.00	75.69	48.52

Source : Sone CADA, Patna, Annual Progress Report,  
1978-79, p.35.



From the table it is apparent that most of the construction work in the Sone high level canals was over by the end of 1977-78 when 156 thousand hectares irrigation potential was supposed to have been created out of 161 thousand hectares to be created. In so far as utilization of the created potential is concerned, it has been rather poor during all these years.

Important Features of the Sone Command Area :

The area Commanded by the Sone canal system (see map no.1) extends between 24°, 25' to 25° 25' north latitudes and 83° to 85° 15' east longitudes in the south west of Bihar. It comprises of five districts, namely Bhojpur, Rohtas, Patna, Gaya and Aurangabad, covering 13,276 villages (11,466 inhabited and 1,810 uninhabited). According to 1971 census, the total population of the area is about 9.75 million which is about 17.3 per cent of the total population of the state of Bihar. The percentage of literate population is 25.5 as against 19.9 per cent for the whole state. The total number of farmers is about 1.17 million comprising about 1.12 million males (95.88%) and about 48 thousand females (4.12%). Among them, about 0.69 million are marginal farmers (59.45%), having land less than one hectare and about 0.2 million small farmers (17.65%), having one hectares to two hectares of land. The total population of agricultural labourers is 1.13 million, consisting of 68.46% males and 31.54% females. Of the total population, 19.25% are scheduled castes and 0.43% scheduled tribes. The population density of the area is about 401 persons per square kilometre as against Bihar's 324. The rural population constitutes about 86.7 per cent of

the total population of the command area, compared to Bihar's 90 per cent and India's 80 per cent.

The total geographical area covered under the Sone Command Area Development Agency (CADA) is 2435202 hectares, which comes to 14.05% of the total area of the State as a whole. Out of this, forest cover 267268 hectares (10.97%), barren and uncultivable land is 109933 hectares (4.51%), land put to non-agricultural use is 266448 hectares (10.94%), permanent pastures and other grazing land is 10095 hectares (0.41%), cultivable waste land is 29976 hectares (1.23%), miscellaneous trees and plantations not included in the net sown area is 7728 hectares (0.31%) and current fallow is 250123 hectares (10.27%). The net area sown is 149363 hectares which comes to 17.88% of the net area sown in the State as a whole. Net area sown as a percentage of all types of cultivable land in the command area is 83.84% as against Bihar's 71.27%. The gross area sown in different seasons is 2140513 hectares, giving a crop intensity of 143 per cent which is slightly higher than the crop intensity for the State as a whole (135%).

The bulk of the holdings are small, fragmented and scattered. It is estimated that the marginal farmers' holdings (less than 1 hectare) constitute about 65% of the total number of holdings but comprise only about 17.5% of the net cultivated land. The small farmers' holdings (1 to 2 hectares) constitute about 16.5% of the total number of holdings and comprise about 13.5% of the net cultivated land.

The net area that can be brought under cultivation is 1.78 million hectares which is about 73.15% of the total geographical area of the region. The net cultivated area (1.49 million hectares) is about 61.33% of the geographical area and is about 83.84% of the net area of all types that can be brought under cultivation in the region. Out of 1.49 million hectares of net area sown at present, 1.15 million hectares receive irrigation from various sources. The assured irrigation is available only to 880 thousand hectares during the main crop season i.e. Kharif season. There is a fall in irrigated area in Rabi season. Irrigation from the canals is almost negligible in hot weather season. Thus out of 1.15 million hectares of irrigated area. 1.06 million hectares is irrigated in Kharif and only 430 thousand hectares is in Rabi. The major crops grown in the area during different seasons are : paddy maize and moong during summer, paddy, sugarcane (the plant lasts for a year) maize, arhar etc. during Kharif and wheat, gram, potato, barley, oilseeds and onion during Rabi.

Land in the south Sone Command Area is essentially alluvial soils belonging to the Gangetic plain, except for a portion in the southern and western parts, i.e., Rohtas and Gaya districts which have the forest soils. The alluvial thickness increases from south to north. This kind of soil has very little water-retaining property, which dries up very soon after the rains. The ground-water table is very low in South Bihar, excepting in those parts which are adjacent to the Ganges. The area has a marked slope from south to north which causes quick flow of water.

The annual average rainfall in the Sone Command area is 1116.54 mm. against Bihar's average of 1270 mm. The annual normal rainfall of the five districts are as follows; Patna 993.8 mm; Bhojpur 1077.6 mm; Rohtas 1143.8 mm; Aurangabad 1236.7 mm. and Gaya 1130.8 mm. The average number of rainy days in various districts vary from 55 to 57 per annum. The monsoon normally breaks in June end. The Hathia (post monsoon) rainfall is very critical for Kharif paddy which is the major crop of the area as well as for field preparation for Rabi. However, a study of rainfall pattern reveals that Hathia rain fails quite frequently in South Bihar. Thus, the natural conditions are so adverse that regular cultivation in most parts of South Bihar is not possible if left to the mercy of the nature.



Notes and References

1. National Commission on Agriculture, 1976, part V, Resources Development, p.1.
2. Draft Sixth Five Year Plan, 1980-85, part II, Government of India, Planning Commission January 18, 1981, p.26.
3. According to a revised classification adopted since April 1978 the major schemes are those which have a CCA (Cultural-ble Command Area) of more than 10,000 hectares and medium schemes are those which have a CCA of more than 2000 hectares but upto 10,000 hectares. Minor are those having a CCA of less than 2000 hectares.
4. Sixth Five Year Plan, 1980-85, part-II op.cit. p.173.
5. See Kurukshetra Vol.XXI No.24, September 16, 1978 Special Number on Command Area Development Programme.
6. This section is more or less based on the information available in the "Annual Progress Report of the Sone CADA, Patna, 1978-79
7. F. Buchanan, An Account of Districts of Bihar and Patna, in 1811-1812, Vol.II, p.535.
8. Ibid. p.534.
9. Report of the Irrigation Commission, 1972, Volume III (Part-I), Ministry of Irrigation and Power, New Delhi, pp.120-121.
10. District Gazetteer, Shahabad, 1960, p.212.
11. Report of the Irrigation Commission, 1972, Volume III(Part I), p.120.
12. District Gazetteer,Shahabad, 1960, p.220.
13. Draft outline of the Fourth Five Year Plan, Government of Bihar, p.51.

## CHAPTER II

### REVIEW OF IRRIGATION FARMERS' ORGANIZATION

#### Theoretical Controversy

The literature pertaining to hydraulic theories is subject to various types of theoretical propositions which sometimes are of opposite nature. The major controversy centres around the centralized/decentralized authority structure for irrigation management. The centralist led by Steward and Wittfogel have posited that large-scale irrigation requires centralized co-ordination and direction of efforts, which, in turn, leads to greater political integration. Thus, they have proposed that irrigation is a major "cause" of the emergence of centralized political authority and supra community political organizations and, as such, a major "cause" of the development of early states and civilizations. Steward proposed that the "irrigation civilizations" (Egypt, Mesopotamia, China, Mesoamerica, and the Central Andes) had common basic cultural features and developmental sequences because their adaptation to an arid or semi-arid environment required large scale irrigation.<sup>1</sup>

Wittfogel has put forward the thesis that large scale irrigation results in authoritative political patterns even to "oriental despotism". Hydraulic agriculture requires great co-operative effort, organizing capital and labour to build dams and canals, for example, and this has been provided typically by an all powerful "agromanageial" bureaucracy.<sup>2</sup>

Steward, Wittfogel thesis is subject to criticism by an array of scholars. Millon finds, "no clear relationship between degree of centralization of authority and the size of the irrigation system or the number of persons it supports".<sup>3</sup> Leach argues that although there were large irrigation works in Ceylon, there is no evidence that such irrigation works produced the hydraulic bureaucracy required by Wittfogel's thesis.<sup>4</sup> Similarly the findings of Mass's recent study go contrary to Wittfogel's thesis. "To meet the demands for co-operative effort in hydraulic agriculture, which are indeed great, the water users of Spanish and U.S. systems have shown a genius for inventing operating procedures that avoid centralized and despotic political power. Systems that were in existence before the central government invested money and technical expertise have to a remarkable extent protected their autonomy and even defied national policies that are supposed to accompany national money if these policies have been a serious threat to local custom".<sup>5</sup>

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Recently some scholars have been arguing in favour of a reformulated Wittfogel hypothesis "to state that if there is centralized direction of irrigation activities in arid and semi-arid environment, then there will be a corresponding increase in centralized political power in other areas of social life. The extent of political power will vary directly with the extent of the irrigation system and its importance to the total economy."<sup>6</sup> Similarly a compromising thesis has been advanced by Robert Hunt on the basis of the preliminary findings of a comparative study

of canal irrigation systems drawn from Japan, Taiwan, Phillipines, Sri Lanka, Iraq, Spain and Mexico. "The major argument is that all irrigation facilities are unified operations at some level, and the unified executive has responsibility for allocation, maintenance and conflict resolution. Some systems contain irrigation communities and some exhibit political centralization. Some are unified from the top down, by means of a politically centralized bureaucracy. Others are unified from the bottom up, by means of irrigation communities".<sup>7</sup>

### Participation and Development

In spite of the position taken by some of the authors, a large number of studies of rural development both at the national level and at the project level have emphasised the importance of participation for rural development. A sixteen country comparative analysis of Asian experience by the rural development committee at Cornell university found national success, measured in terms of both agricultural productivity and social welfare measures, strongly correlated with effective systems of participatory local organizations linking rural communities to national centres of decision making and implementation.<sup>8</sup> Owens and Shaw argue that the "first step in development is to organize the mass of the people in autonomous local institutions".<sup>9</sup> Similarly Schumacher is of the opinion that, "development does not start with goods, it starts with people and their education, organization, and discipline. Without these all resources remain latent, untapped, potential".<sup>10</sup> Sartaj Aziz in a recent study has suggested a model for rural



development based on the Chinese experiences. One of the most important elements of the model is the "organization of the rural population for collective or cooperative activities appropriate to the stage of development and to the level of technology that has been reached".<sup>11</sup>

### Irrigation Farmers' Organizations

What applies to rural development in general applies to irrigation development and its utilization in particular. Mass on the basis of his recent study concludes : "To succeed for any length of time, to capture and distribute available water, and to control the amount of land placed under irrigation, farmers must develop self-discipline and a high level of community organization. We have observed these forces operating in a number of the World's deserts, especially those of south-eastern Spain and Western United States."<sup>12</sup>

The irrigation projects with their complex engineering and bureaucratic organizations can not be successful without the active participation of beneficiary farmers in the management process. The findings of various scholars like Mass, Coward, Levine, Lowdermilk, Freeman, Wickham, Taylor and Abel have shown that local collective organizations have been very effective in the irrigation management process in terms of distribution of water, maintenance of water supply structures and resolution of conflicts at the local level.<sup>13</sup> Consequently the literature on irrigation management in recent years has given increasing attention to the value of organized participation by water users in the management process.<sup>14</sup>

In India, irrigation systems were built as early as the second century A.D., and their maintenance by water users also dates back to antiquity.<sup>15</sup> The Vayiramega - tataka (Circa 775-820 A.D.) of Uttiranmerur in the Chingleput district was probably built during the times of Pullam Kings. "After its construction by the King its management and repairs seem to have been entrusted to be looked after by village authorities or private individuals".<sup>16</sup> According to the inscriptions (Circa 1367-1375) boats were used to remove the silt from dams and tanks and carts were kept for putting the earth on the bunds annually and keeping them in good condition. "To meet the expenses a small quantity of paddy on the cultivable land collected from the villagers was used."<sup>17</sup>

In recent years the issue was first highlighted by Henry Hart. Writing two decades earlier on Damodar valley administration he said that the real problem was that of establishing and maintaining local institutions for irrigation which may fulfil new roles. He mentioned, "the system of regulating turns at the ever flowing channel night and day, in the Punjab village," as a fine example in this regard.<sup>18</sup> Reidinger, writing in mid seventies also suggested creation of "water users" association at the watercourse level. This, he thought, would increase flexibility of water-supply within a watercourse, which was not possible under fixed warabandi system.<sup>19</sup>

After two decades Henry Hart has raised the issue of collective responsibility afresh. In a recent paper he has put the issue as follows : "One can make out, in 1978, a whole series of

choices being made which will tend to establish the future structure of government-cultivators relationships over the irrigated third of India. Immediate placing of obligations on farmers through government authority, possibly followed by political rejection of these obligations, is one structural form. Building collective responsibility among irrigation farmers from the start seems logically to be the alternative".<sup>20</sup>

The local association of irrigation farmers consisting, say for instance, of users of the same watercourse, can be effective institutional means of not only solving local irrigation problems but may also work as a pressure group to safeguard their interests. This is equally important in the Indian scene where the idea seems to be gaining ground that instead of public administration, we have 'pressure' administration, i.e. administration working only under pressure of different kinds. That without pressure, administration does not move.<sup>21</sup>

It is generally agreed that irrigation system cannot function properly unless beneficiary farmers are ready to perform part of the work done by the paid officials. Government of India's strategy for command area development includes from the start farmer organizations as necessary to run the micro-system.<sup>22</sup> Government's concern for the organization of the poor is explicitly manifested in the Draft Five Year Plan 1978-83, which says, "critical for the success of all redistributive laws, policies and programmes is that the poor be organized and made conscious of the benefits intended for them

The general lesson of the experience so far is that because of leakages in delivery system and ineffective administration, rural programmes fail to improve the distribution of income. The Planning Commission is proposing a massive shift of resources in favour of rural areas with an inbuilt redistributive character in almost every programme. But whether the larger resources will have the desired equality effect will depend on the extent to which the organised pressure of the beneficiaries counteracts the weaknesses of the administration and the opposition of the vested interests."<sup>23</sup>

The sixth Five Year Plan (1980-85) has also given emphasis on the participation of the farmers in the scientific management of the water and soil resources of the area.<sup>24</sup> The desirability of having irrigation farmers organization for better utilization of water has been emphasized time and again in various communications of the Union Government to the State Governments. The CAD programme has from the start taken farmers organizations as necessary to run the micro-systems.<sup>25</sup> In spite of these pronouncements, there are very few available cases of irrigation farmers organization and still fewer cases where these organisations are successfully operating. In the pages to follow we would try to highlight the current state of affairs in India in this respect.

Irrigation farmers organizations known as 'Pipe Committees' were first thought of in Sriramsagar Project in Andhra Pradesh in 1976 after systematic land development under pipe outlets.<sup>26</sup> The same were later introduced in Pochampad Project. Regarding



Pochampad experiment, Hart observed that the Pipe Committees in that project started with certain advantages and the strongest was that they were invested to solve the problems of this project by the officer responsible for it, talking about those problems with a future irrigator.<sup>27</sup> It is contended that the Pipe Committees are organized on the basis of fair and free elections or by consensus of the members under the Pipe. The Committee represents the beneficiary of Head, Middle and Tail end and under no circumstances any member represents more than one group.<sup>28</sup> It is proposed to give 'Pipe Committees' statutory status in Andhra Pradesh in the forthcoming legislation. By July 1981 Warabandi was introduced in 350 minors in the state and the Pipe Committees had been formed under each outlet in CAD Projects.<sup>29</sup> In the drought prone areas of Tungbhadra project in Andhra Pradesh, very strong village committees, dealing with irrigation problems, have been reported by Wade. These Committees collect funds, appoint common irrigators and sluice guards to patrol distributaries at the top end of canals, arrange representations to officials and politicians and has a sizeable common fund for different expenses. Wade finds scarcity of water and corporate and specialized irrigation in the area. On the basis of his observations in the field, he hypothesizes a clear cut relationship between water scarcity and corporate response.<sup>30</sup>

In Gujarat, where successful working of co-operative societies is so well known, Asopa and Tripathi had suggested creation of water co-operatives in mid seventies for ensuring

stable and predictable supplies of water to cultivators.

They had envisaged three stages of growth for these co-operative organizations. In the first stage the cooperatives were expected to be mainly concerned with the evolution of functional water scheduling policies. In the second stage, in addition to their irrigation functions, they could become a reliable source for timely supplies in adequate quantities of the agricultural inputs. In the third stage these cooperatives could assume the role of an intermediary organization between the irrigation department and the irrigators. They could purchase water at negotiated rates in bulk from the irrigation department and distribute it to the members at a price that would leave an appropriate margin for the cost involved."<sup>31</sup>

In spite of the above mentioned manifestations and all the talk about Gujarat's efforts in forming farmers' co-operatives for the distribution of water, very few water co-operatives have so far been formed and still fewer have been successfully working.<sup>32</sup> In the Ukai Kakrapar irrigation project, which took the lead in the formation of such co-operatives, only one case of successful working exists and encouraged by the results obtained in this case, other co-operatives are being formed. This co-operative society was formed in March 1979 with 11 members which increased to 173 by March 1981. The society covers four villages in Choryasi Taluka of Surat district and has a CCA of 420.24 hectares. The distribution of water has been left completely to the co-operative. The water is supplied in measured quantity from fixed outlets; measuring

devices have been installed for this purpose. The State does not come into direct contact with the cultivators. It charges the society at the rate of 25 paise per 10,000 litres of water supplied. Normally the maintenance of the field channels has been left to the cultivators. There have been cases, however, where cultivators on their own have gone to the society and the society has got the channels repaired and improved at the cost of the affected cultivators. The disputes regarding the share of water have been amicably and informally settled. The society has been able to improve the use of water by penalising waste. The society has purchased one tractor to achieve better co-ordination in ploughing and operations and to supplement the work of tractors owned by cultivators and those available from custom centres operated by Gujarat Agro Industries Corporation.<sup>33</sup>

Apart from this two other cases of successful working of farmers organizations, though not cooperatives, have been reported in Gujarat. The first case deals with an ancient surface irrigation system, known as Khasi sluice irrigation. In this system in Nawagaon village in Kheda district, farmers have set up a seven member management committee for carrying out maintenance work in the field channels just before Kharif irrigation starts. The committee is an informal affair. The functions of the informal association are simple and limited and they are to maintain the system below the outlet and act as a liaison between irrigation bureaucracy and the farmers. The second case pertains to Mahikadna Irrigation project of recent

origin (the dam was completed in 1978) and refers to the area under Ravalpura sub-minor. The area involves about 206 hectares in three villages served by 15 outlets of 1 cusecs each. The informal committee formed in 1978 cuts accross village lines and represents all three villages. The functions of the committee do not go beyond maintenance of the system and liaison with irrigation bureaucracy.

The author concludes that the certainties in irrigation supplies were chiefly responsible for farmers coming together. The study of an old irrigation project, which offered only protective irrigation during Kharif season revealed that under conditions of scarcity, water becomes valuable commodity and farmers mobilized their resources to keep the system in good condition so that full utilization of irrigation was obtained. The farmers cheerfully bore the expenditure of maintenance contributing their own labour money. In the second case, the uncertainties and inadequacies in supply, mainly due to frequent disruption in schedule and insufficient physical structures, led to distrust among the tail-end farmers in the Irrigation department. However, the introduction of rotational water distribution at the farm level altered the atmosphere, no doubt it required an investment of tall order.<sup>34</sup>

In case of Maharashtra, the Maharashtra Irrigation Act 1976 provides for the water committee. The wide ranging functions of the committee are, proper distribution of water, deciding crop to be grown, to maintain the irrigation system of the canal beyond the outlet, to assist the cane officer, to impose a



penalty for unauthorised use of water etc. The Government policy has been to promote irrigation management by co-operatives. However, the response for the last 30 years has been passive.

Indigenous system of group management of irrigation water available through small diversion weirs (Bandharas) popularly known as Phad System is prevalent in Nasik and Dhule districts for the last three to four centuries. It is reported to be working successfully in the areas even now. The salient features of the system as it operates today are; (i) The decision making unit is the informal collectivity of the beneficiaries meeting at least once before the start of the crop season; (ii) The assembly of beneficiaries informally chooses Panchas, representing all the phads under the designated bandhara; (iii) Panchas decide the cropping pattern, allocation and rotation of water, impose fines on the recalcitrants; (iv) The canal systems running into several Kms. (including idle length of 5 to 10 Kms running in deep cuts, sometimes as high as 60 fts.) is maintained by the beneficiaries through the instrumentality of Panchas. Contributions (in physical or monetary terms) are fixed on the basis of acreage; (v) The payments to Patkaris (watermen), Hawaldars (inspectors) and Jagala (watchman) are fixed in kind based on acreage and are paid during the harvesting time by each beneficiary and; (vi) The beneficiaries pay irrigation dues to the Revenue Department as fixed by the Government from time to time.<sup>35</sup>

In case of U.P., the Northern Canal and Drainage Act 1873 confers the rights of distribution of water with the beneficiaries who are supposed to fix and apportion their shares by mutual agreements. Only in cases of disputes the beneficiaries were required to apply to the executive engineer for an osrabandi under the above Act. As far back as in the year 1890 cultivators started submitting written mutual agreements of the beneficiary cultivators to the executive engineers. These agreements were for sharing of water amongst them day-wise. Subsequently when these agreements did not work, the cultivators insisted the executive engineer to record the agreements on stamp papers. Three types of osrabandi, namely Thok-wise, Chak-wise and Village-wise can be prepared according to the convenience of the cultivators. At present Chak-wise osrabandi is in vogue in western U.P.<sup>36</sup> In the older systems of irrigation in U.P. osrabandi is widely prevalent. Efforts are now being made to adopt osrabandi in new irrigation systems, particularly the large canal projects like Gandak, Ramganga and Sharda Sahayak.

The U.P. Area Development Act, 1976, which created the three CAD Authorities in U.P., has made provision for irrigation farmers organizations. The Chak Sabha consisting of all the land holders in an outlet command "shall be the owner of all works constructed for land development of the outlet command" (Sec.22). The Chak Sabha elects five members from amongst themselves to be members of Chak Samiti with a Chairman and a Secretary-cum-Treasurer (Sec.23). The functions of the Samiti

are, maintenance of outlet system, carrying out osrabandi and implementation of physical works of land development and cropping in the outlet commands (sec.24). The Chak Sabha begin to work after the outlet area is handed over by the Irrigation Department to CAD Authority. The farmers of the outlet meet, discuss and approve the OFD plan for the command area. The beneficiary farmers are involved in general assistance to the soil conservation staff engaged in the land developmental activity.<sup>37</sup>

Henry Hart who visited seven command area development projects in India during July-August 1978, found farmers collective efforts successful in two projects and Sarda Sahayak in U.P. was one of the two (the other being Pochampad in A.P.). He writes, "It was accordingly surprising to me to discover committees representing the irrigators under each outlet, alive and well in U.P.'s Sarda Sahayak project. I visited and questioned officers of 10 such committees in Barabanki district. They are called Kulaba samitis, Kulaba being the local term for pipe outlet. Save for one Samiti where field channels had just been completed, all had done at least one collective cleaning of the channels. They were prepared to work out and propose a roster of turns (in U.P. Osrabandi) though whether the Irrigation Department would take advantage of this initiative is to be seen".<sup>38</sup> In Sarda Sahayak, the staff units responsible for construction of field channels got the involvement of the cultivators while designing micro-networks. They employed irrigators to do about half the construction labour on the channels, and the Kulaba Samitis supervised the quality of construction as

watch dogs.<sup>39</sup>

In Bihar farmers collective efforts have not been a feature of the large scale irrigation systems. Around mid seventies, a committee at the watercourse level, created by the State Government, consisting of VLW, patrol, two representatives of beneficiaries and mukhiya of the respective panchayat, no doubt existed, but on paper alone. In spite of persistent insistence on the part of the Union Government, the CAD Agencies in Bihar have not made any significant progress in this direction. A few irrigation farmers organizations, no doubt, exist in Sone and Gandak command areas but no such organization is in existence in Kosi area. Though farmers' collective efforts are almost non-existent in the major irrigation projects but in South Bihar, where the indigenous system of irrigation known as ahar and pyne are widely prevalent the irrigators' collective efforts keep them going. The ahar and pyne system is in existence for centuries and has been a major source of irrigation during all these years.

Although no provision of irrigation farmers organization was made by Bihar Government in the large irrigation projects, but government did provide the institution of Sattadar which was in existence in Bihar for the last several years. The Sattadar used to be a link between the irrigation officials and the beneficiary farmers. He used to assist irrigation officials in the assessment of water rates and was given 2 per cent of assessment as his commission by the government. There used to be a Sattadar for every water course having land in that water



course. Sattadar used to be elected by the farmers having land in the command of that watercourse which he represented in the presence of the Ziladar. The term of a Sattadar was coterminous with that of the satta, i.e. one year or ten years. After the end of the Satta period, he could continue for another term with the consent of the farmers and S.D.O. irrigation. Generally the Sattadar held office till he lived. The Sattadar in Tarwan (one of villages studied by us) held office from 1942 till its abolition in 1975. The Satta is a prescribed form for requisition of water. There are two types of Sattas - long lease for ten years and short lease for one year. The document indicates total land to be irrigated, location of the plots and the name of the owner of the plot.

Sattadar's was a key post in irrigation matters at the local level. He was a mediator between the beneficiary farmers and the irrigation administration. He used to discharge the following functions: (i) Preparation of long lease and short lease Sattas and presenting these to the SDO(irrigation). On the basis of it the SDO determined the amount of water to be supplied to that particular water course; (ii) To help Amins and Patrols in the measurement of irrigated land for the assessment of water rates; (iii) To distribute Parchas (water rate bills) to the concerned irrigators which he used to receive from the Sub-Division office; (iv) To carry the disputed Parchas to the SDO for their rectification and also to present the grievances of the beneficiary farmers before the irrigation administration.

Apart from these specific responsibilities, the Sattadar used to perform several other functions. Being the key functionary at the lowest level he used to be responsible for the proper maintenance of the water course. He had to interfere in case any body obstructed the flow of the channel by cutting it. He also used to see, whether or not all the farmers were getting water? He played a primary role in the resolution of conflicts arising out of the distribution of irrigation water among the beneficiary farmers. He also helped collectors of water rates. They used to come to him first and he used to guide them to the concerned farmers. Any official of the irrigation department used to first meet the Sattadar regarding any enquiry concerning irrigation.

The Sattadar sometimes used to take the cause of the irrigators and bring it to the notice of the higher authorities for its redressal. The following illustration narrated by Jairam Singh, ex-Sattadar of Tarwan is worth mentioning in this respect. Initially the Rewa distributory passing through village Tarwan was connected with a distributory of another village which created the water scarcity for both the villages. Mr. Singh being Sattadar prepared a petition for making Rewa distributory independent, connecting it with main canal with signatures of the most of the villagers and sent it to higher authorities. He organized several meetings of the village farmers, made the farmers of the other village agreeable to this proposal and met with the higher authorities. As a result, the distributory was later independently connected with the main canal at Bikram.

Thus, the Sattadar used to be a representative of farmers irrigating from canal water and used to be in close touch with SDO and his staff for getting farmers problems solved. Cultivators and officials in Bihar are unanimous in demanding the restoration of the institution of Sattadar. It is pointed out that the Sattadar used to have intimate knowledge of the irrigated plots and their ownership and his assessment of water rates used to be authentic. As a result, there used to be few cases of remission and alteration. The Sattadar used to be of assistance to cultivators as well as the officials. He used to communicate farmers' difficulties to officials and present officials' position to the cultivators. Not only he used to be useful in the distribution of water among farmers, maintenance of water course and resolution of conflicts among farmers but during emergencies and periods of crises his services were of extreme utility to both cultivators and the officials.

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38. Hart, Henry : Anarchy, Paternalism, or Collective Responsibility Under the Canals? op.cit. p.A.131.
39. Ibid, p.A131. However, one of the authors who visited Barabanki district during June 1980 and July 1981 found most of the Kulaba Samitis existed on paper, including the Kulaba Samitis visited by Henry Hart.



### CHAPTER III

#### IRRIGATION FARMERS ORGANIZATION IN SONE COMMAND AREA

The Sone Irrigation Project has a history of over hundred years and the major portion of Sone Command area (erst-while Gaya and Sahabad districts) has an antique tradition of indigenous irrigation involving collective human efforts. Inspite of this we do not find any trace of irrigation farmers organizations in the area except a semblance of it in the institution of Sattadar. In recent years the idea of Co-operative Irrigation (Chak) Society was given by the Agricultural Finance Corporation in its project reports on Sone and Kosi. It suggested the formation of chak societies at the water course level consisting of one or two outlets with a coverage of the area between 200 to 400 acres. The name chak was given because the area falling under the elementary irrigation-cum-drainage system is commonly known as chak in Bihar.<sup>1</sup> Later the Co-operative Department of Government of Bihar framed model bye-laws for the society.

According to the model bye-laws<sup>2</sup>, a cooperative irrigation chak society is one which is registered under the Bihar and Orissa Co-operative Societies Act (Act VI of 1935). Every person owning land or recorded under raiyats in the area of operation of the society shall be eligible to become a member of the society and would constitute a member of the general body which would be supreme authority of the society. The management of the society shall vest in a Managing Committee of seven members. All the members of the managing committee will be

elected by the general body. The society would have a Chairman, a Secretary and a Treasurer. The main purpose of the society will be to maintain common irrigation and drainage works of the chak; to own or hire appliances, water pumps and plants for the irrigation of the lands of the members; to maintain the irrigation structures in the chak and to regulate and supervise the supply of water in the chak and distribute it to the members' fields in the most just manner. The capital of the society shall be made up of shares of Rs.25/- each. Each member will have to subscribe at the rate of atleast two shares per acre of his land to be irrigated. It can, however, raise funds from members and cooperatives and other institutions.

One of the difficulties faced by the Sone CADA, which is supposed to form irrigators organization, is the lack of consolidation of holdings in the area. It is felt that OFD (on farm developments) works are not possible in the absence of consolidation of holdings because under the consolidation of holdings Act a good percentage of land is provided for field channels, field drains and farm roads without paying any compensation to the cultivators. Therefore, the first step in the formation of farmers organization is the consolidation of holdings and the Sone CADA has been insisting on the voluntary consolidation scheme prepared by the tenants which is provided in the Act as under :

1. The Deputy Director of consolidation may recognise a consolidation scheme in respect of a village within or without a consolidation area, prepared voluntarily by the tenants of the village, where he is satisfied that it conforms to the broad principles of consolidation under this Act and has the support of the tenants

concerned and is otherwise fair to all concerned.

2. The consolidation scheme recognized under sub section (1) shall be deemed to have been prepared and confirmed under the provisions of this Act, and shall be enforced there under.

Hard pressed by the Union Government, the CADAs in Bihar have been trying to step-up the formation of the water users organizations which may be of help in the maximum utilization of irrigation potential in their respective commands. During July 1978 and January 1979, seventeen cooperative irrigation (chak) societies were registered in the Sone Command Area. Their district-wise distribution was as follows : one in Bhojpur, two in Rohtas, four in Aurangabad and ten in Patna.<sup>3</sup> While most of these societies are on paper, three societies two in Patna district (one registered and one unregistered) and one in Rohtas, show any promise and it is these three societies which we would discuss in some details.

Tarwan Co-operative Irrigation (chak) Society :

Tarwan village was selected by Sone Command Area Development Agency with a view to make a demonstration of 'on-farm development' works which included consolidation of holdings and provision of field channels, field drains and farm roads. In Tarwan village the Sone CAD authorities, the Mukhiya of the village Panchayat, the Project Officer and the Agriculture Officer of Naubatpur block had several meetings with the farmers of that village on 25.3.1976, 3.5.1976 and 4.5.1976 for convincing the farmers for the formation of the chak (voluntary consolidation of holdings) and OFD demonstration. The Mukhiya who is

a graduate and an ex-headmaster of a high school played a decisive role in convincing the farmers about the advantages of consolidation of holdings and later in the formation of the chak society. By April 1977, the work pertaining to consolidation of holdings was completed and on 28th April 1977 a meeting, consisting of affected farmers and officials, was called for discussing the construction of field channels etc. For the supervision of the construction work, Mr. Ramnath Prasad Singh (present secretary of the society) was selected as a headman from the farmers' side. Later on instructions were given to the agriculture wing of the block from the higher authorities for giving technical assistance to the farmers of Tarwan chak society.<sup>4</sup>

#### Salient Features of the Chak and the Village

The chak consisting of 127 acres forms a part of the village Tarwan. All the 77 chak members (those having land in the chak) hail from the same village. The village is situated on the left bank of new Rewa distributory at a distance of 5 km. from the Naubatpur block headquarter and the police station. The village is served by the Bikram Sub-division of irrigation department which is about 11 km. from the village. Patna is 40 km. north west of the village. The village has a primary health centre attended by a homeopathic doctor and also a primary school for the children. Middle and high school are in Naubatpur and a college at a distance of 8 km. from the village. The village has a gram panchayat.

The total population of the village according to 1971



Census is 1,210. The occupational engagement of the population is as follows : cultivation 241 (226 male + 15 female), agricultural labour 188 (103 male + 85 female), household industry 8 (5 male + 3 female), trade and commerce 12 (9 male + 3 female), transport and communication 1 (male) and other services 16 (all male). The total working population of the village is 466 (360 male + 106 female) and the non-workers are 744 (272 male + 472 female). Out of the total population the number of the literate in the village is 349 (262 male + 87 female). There are 232 (109 male + 123 female) scheduled castes in the village. There are 222 households in the village and in terms of caste structure, 36.03% of the household consist of Bhumihars, 3.15% of Brahmins, 20.21% of Yadavs, 19.36% of other Backward castes and 21.17% of the Scheduled Castes. All the Scheduled Castes are landless except one who is a marginal farmer. 33.33% Yadavs and 37.20% other Backwards are also landless. None of the Bhumihars and Brahmins are, however, landless.<sup>5</sup>

The total area of the village is 301.85 acres. Out of it, 30.13 acres of land is uncultivable. Net sown area is 271.72 acres in which more than one crop is sown. In matters of irrigation facilities, the sources are as follows; 8 wells, 5 tube-wells and 2 pumpsets. The canal irrigation is served by Bikram Sub-division (Irrigation). New Rewa distributory rising out from Patna main canal at Bikram crosses through the village. Five outlets have been provided for the village each of 6" diameter, having a supply of one cusec of water. There is one VLW for the village under the TV programme. Three crops are sown

in the village and the rotation is as follows : Kharif consisting of paddy, rabi consisting of maize, wheat and pulses, and hot weather consisting of munga (kidney bean), till (sesamum seeds) and maize. Paddy is sown in 232.18 acres (197.6 acres irrigated and 34.58 unirrigated), wheat is sown in 148.20 acres.<sup>6</sup> No pucca road passes through the village, one unmetalled road links the village with Naubatpur - Bikram road.

#### Formation of Tarwan Chak Society

In March 1976, Sone CAD authorities wrote to the Project Officers of Naubatpur and Bikram for the sites for OFD demonstrations. It was mentioned that "the area of the command should be at least 100 acres in contiguous plot".<sup>7</sup> When Mr. Umesh Prasad Singh, Mukhiya of Tarwan Panchayat came to know about this scheme he contacted officials of the Block and Sone CADA and made all out efforts that the site was chosen from Tarwan village. He also motivated and convinced the farmers that the distribution of the chaks will be done by the representative of the beneficiaries and made them ready for voluntary consolidation of holdings. The layout of the work was done by the Sone CADA and the land measurement was done by the Revenue Department. The work involved the following important steps.<sup>8</sup>

- i. An application for voluntary consolidation of holdings was written to the Collector, Patna district, containing signatures of all the 77 beneficiaries and the details of land records.
- ii. A general meeting (on 19.9.1978) of all the beneficiaries was called and seven members were selected and the name "chak samiti" was given to the society. One of the members was selected as President and another as Secretary of the Samiti.<sup>9/</sup>
- iii. During the course of measurement 2.5% of land was charged

from each farmer for providing farm roads, channels and drains. But no land was charged from those who owned less than one acre of land.

- iv. To the extent possible small farmers were placed at the privilege points.
- v. The chaks of all the farmers were re-allocated in between the irrigation and drainage channels and it was so placed that at one end there was irrigation channel at the top and drainage channel at the bottom. To the extent possible it was also tried to provide the facilities of farm roads to every chak. (See attached maps nos.2 and 3)

Prior to the formation of Tarwan chak society there were 537 total number of plots (see map no.2) but after the consolidation of holdings their number was reduced to 108 chaks (see map no.3). As a consequence of OFD works the chak has a total of 5,209 ft. of lined and 5,135 ft. of unlined channels and 19,171 ft. of drainage channels. The chak is commanded by two outlets of one cusec each, off taking from new Rewa distributory. One channel is constructed from the first outlet while two from the second one. These channels would be referred as A,B and B1 by us. Farm roads to a total length of 8,510 ft. have also been provided. The total cost involved was Rs.101,292.66 (per acre cost Rs.797.58) and it was met by the Sone CADA in the form of a subsidy.<sup>10</sup>

The soil of the area is sandy loam having fine texture. In most of the area the soil is quite deep except in the north portion, covering an area of about 25 acres. The general slope is 0.2% and the direction of the slope is towards north. The average rainfall of the locality is 37.1 inches (on ten years average data basis - source - Naubatpur block). The water requirement for the two main crops is 37" for paddy and 15" for wheat.

The major portion (75.06%) of the 127 acres Tarwan chak belongs to the Bhumihars. In the membership of the Samiti also they outnumber others (49 out of 77). The average land holding per Bhumihar comes to 1.90 acres. The representation of other castes in the chak and their average holding per head is as follows : Brahmins 4 (average 1.87 acres), Garedi 7 (average 0.21), Yadava 1 (average 0.41) Bania 6 and Mahto 3 (both average 0.26), No scheduled caste is represented in the chak as all of them except one are landless although they constitute 21.17% of the total village population. Most of the larger holdings belong either to Bhumihars or to Brahmins.

#### Working of the Chak Samiti

Most of the OFD works in the chak were completed by the first quarter of 1978 and water was first provided by the newly constructed canal structure for the summer crop in 1978. Though no formal organization was formed by that time but Mr. Umesh Singh, Mukhiya of the gram panchayat was the leader of the group which constituted the chak. The formal chak samiti and its managing committee were formed by the general body in its meeting on 19.9.1978. On this section of the paper, the working of the chak samiti would be examined in terms of participation, distribution and maintenance, conflict resolution, social justice, and interaction with government and other institutions.

The samiti members did not appear to be active participants in the samiti affairs. Since its inception in September 1978 till March 1982, only one meeting of the general body (attended by 17 of 77 members) had taken place. Whereas the samiti bye-



laws make it mandatory that the General Body must meet once a year at least. Similarly the management committee has also met only four times during this period (on 25 October 1978, 12 November 1978 14 February 1979 and August 1981). Though the committee consists of 7 members and 2 Scheduled Caste permanent invitees, it was attended by 5 members in the first two meetings and by 3 members in the third meeting and by all the 7 members in the last meeting in August 1981. However, none of the meetings was attended by the Scheduled Caste members because they were never invited and were included in the committee to fulfil the paper requirement.

As regards the distribution of water in the individual fields, the plan is made in such a way that each field gets water independently from the field channel. At the time of full water discharge from the distributory, there is no problem and the water is distributed from upward to downward reaches and the whole chak is irrigated in 8 to 10 days. However, in the event of scarce water supply members have agreed on certain norms and procedures concerning the timings and the sequencing of water. In the Kharif of 1979, for instance, first the smaller plots falling in the west of channel A were irrigated and only after that the eastern larger plots up to the first curb of the channel <sup>taken</sup> were/up. Similarly smaller eastern plots falling between the first curb and the second curb were first irrigated and after <sup>were irrigated.</sup> that western larger plots/ A different procedure was adopted in case of plots commanded by channel B and B1. Initially it was decided to distribute water to the two channels on an hourly

basis - 10 hours to channel B and 14 hours to channel B1. However, after two days, the hourly basis was given up as it failed on account of uncertain discharge of the water in the distributory. So another procedure was adopted, according to which, first day, day irrigation by channel B and night irrigation by channel B1. But that night there was no water supply so a conflict arose. Subsequently, therefore, the proportionate water distribution principle was adopted. Thus, for the timing and sequencing of water, particularly during scarcity, the members have agreed on certain norms and procedures which are generally followed.

As far as the maintenance of the irrigation structure is concerned, in case of both kachcha and pukka field and drainage channels, every beneficiary farmer is responsible to desilt that part of the channel which commands his plot. The office bearers of the society are responsible to get the channels maintained by every beneficiary. It is maintained by the President of the society that group pressure is exerted to obtain the maintenance of norms and procedures once adopted by the society and the farmers follow the rulings of the President invariably. However, in the southern part of the chak near the farm road the water logging problem has arisen due to non-maintenance of the drainage channel. The kachcha drainage channel has disappeared due to the negligence of the concerned farmers. If they had desilted it regularly the water logging would not have occurred at all. It is pointed out by the President that the society has taken it as a minor matter

because the construction has not yet been completed. He is of the opinion that once the construction work is completed, the maintenance would be strictly followed and in case repair is required, the farmers would be asked to contribute proportionately.

Regarding conflict resolution, there is no specific procedure but group pressure and spot decisions are effective in resolution of conflicts. Almost all chak members are available in the chak area during the crop periods and the conflict also generally take place during these periods, therefore, spot decision are regarded as best instead of calling a meeting. (This was explained as one of the reasons for less frequent meetings of the society by the President).

Conflict resolution has been evoked on four occasions. On two occasions conflicts related to disagreement between the parties over the distribution of water. In both the occasions, President's verdict was accepted by the parties though agrieved parties questioned the impartiality of his judgement. On the third occasion a collective unanimous decision was taken and "greater loss was avoided at the cost of lesser loss". The problem involved was water drainage. It arose on account of heavy rains during the monsoon period in 1978. The water logging problem arose because the drainage outlets could not receive the excess water of all the fields. In the natural process the extra water of a upper reach field is drained first and only after it is exhausted the extra water of the down reach field can be received by the drainage channel. However,

in some cases upper reach fields were much bigger than the down ones and drainage of water would have taken a much longer time which would have damaged the crop of the down reach fields due to water logging. Therefore, a unanimous decision was taken according to which upper reach fields were allowed water drainage where these were of small size but where higher fields were of big size lower small fields were allowed drainage first.

During the Kharif of 1980, conflict again arose regarding release of excess water. The society applied a slightly modified measure to cope up with the problem. The new decision was; (i) the larger plots in the upper reaches were prevented from releasing the excess water except in a very limited way, (ii) the two inlets from the distributory were closed with earthen work and a watch was maintained so that no one opened the inlets. The fourth case also occurred during the Kharif of 1980. It arose between two farmers whose plots were adjacent to each other in the command of channel 'B'. The upper reach farmer desilted a portion of the channel commanding his field and not the whole as required by the society. The farmer of the lower reach asked him to desilt the whole portion and an altercation followed in which exchange of hot words took place. Later he had to desilt the whole portion on account of pressure from several chak members to abide by the agreed decision of the society.

The samiti has tried to impart social justice. In the re-allocation of chaks after consolidation of holdings, the plots



of the small farmers were placed at privilege points. Further, no land was charged from the small farmers while from others 2.5% of land was charged for OFD works. Similarly when managing committee of the society was being formed it was decided to include two scheduled caste members in it as permanent invitees. There were two reasons for the inclusion of the two scheduled castes in the committee despite the fact that they are landless. The first, there is an accepted principle of inclusion of two scheduled caste persons in co-operative societies. The second, the landless labourers of Tarwan were planning to form their own labour organization. Therefore, it was thought desirable to include them so that a closer link is developed between the availability of labour, which is a problem in Tarwan, for agricultural operations and the labourers point of view.

After the formation of the samiti, the chak farmers' interaction with the government and other financing institutions has increased considerably. Many resolutions have been passed by the managing committee for various types of help to be rendered to the chak members. Some of these are : request for loans in cash or in kind to the individual farmers from the cooperative and other banks, taking help from the Rural Engineering Organization for preparation of the estimate and Sone CADA for financial assistance for the cementing of the sides of farm road, request for the payment of the estimated money from the Cooperative Department for the construction of a godown for the storage of the grains, request to the Minor Irrigation

Department for the instalation of three 6" diameter tubewells and request for a power tiller from Sone CADA.<sup>11</sup>

During a visit in March 1982 by one of the authors it was found out that OFD works were yet to be completed in the chak. No work has been done in the chak by Sone CADA after 1978. The Samiti has been able to adopt and adhere to some kind of system for a dependable water supply and its equitable distribution, maintenance of structures and resolution of conflicts. In August 1981, the Executive Committee had a meeting, which decided that the President would contact the higher irrigation officials for the maintenance of expected water in the distributory. The second decision was to make the Secretary responsible to see to it that the farmers desilted the channels, particularly the unlined ones, commanding their plots. He was asked to check it every seventh day. The President approached the Irrigation Commissioner and complained about the scarce water supply in the new Rewa distributory on account of non-adherence of rotation by the Irrigation Officials. The Commissioner's action led to adherence of rotation but Tarwan farmers found out to their dismay that the cultivator's of Arap (adjacent higher reach village) used to cut open the distributory. The Secretary then fixed the duty of the chak farmers turn-wise to keep a watch over the Arap farmers for 6 days so that they did not cut open the distributory and the watch of the "Swayung Sewaks" (volunteers) paid off : the farmers of Tarwan started getting more dependable and more adequate water in their fields.

### Telpa Irrigation Chak Samiti

The village Telpa, like Tarwan, was also selected by Sone Command Area Development Agency, with a view to make demonstration of OFD works on a limited area of 54.70 acres. All the works pertaining to consolidation, irrigation structures and Chak roads were completed upto the Kharif period of 1978. For supervision of the construction works, Mr. Sidheshwar Prasad Singh (the Mukhiya of the village) was selected as headman from the farmers' side who was, till the time of investigation (March 1982), president of the Chak Society. Later higher authorities gave instructions to the Agriculture Officials of Bikram Block to render technical assistance to the beneficiaries of Telpa. Telpa case is different from Tarwan in two respects. First, it is not a registered society with the co-operative department of the State Government like Tarwan is. Second, the farmers of Telpa village made efforts to get the OFD work done by the Sone CADA on an additional part of the land, totalling 153.85 acres which falls at a stretch adjacent to the earlier chak of 54.70 acres. The first farmers' meeting pertaining to the new chak was held in April 1978 in presence of the Assistant Director and the Junior Engineer of SCADA local office in the auspices of CADA's sub-division office at Bikram. Therefore, for convenience sake, we would call the 54.70 acres chak as "old chak" and 153.85 acres chak as "new chak".

### Salient Features of the Chaks and the Village

The old chak of the village consists of 54.70 acres of land which constitute 21.88 per cent of the total 250 acres cultu-



able land in the village. If we include the new chak, it covers 83.42 per cent (208.55 acres) of the culturable land. All the 33 members of the old chak belong to the village itself while there are 45 members in the new chak. This includes 33 members of the old chak and 3 members of neighbouring villages namely, Denara, Mazarpura and Ganga having land in the new chak. Thus, all the farmers of the old chak are included in the new chak. Both the chaks are situated at right (southern) bank of the Patna main canal while the village is situated at the left (northern) bank of the canal.

The village Telpa (Masauda) is a small village under Bikram block in Danapur Sub-division of Patna district. It is situated more than 60 kms. away in south west of Patna. Canal irrigation to the village is served by Bikram Irrigation Sub-division. The village has a Gram Panchayat consisting of four more nearby villages namely, Ganga chak, Aaspura, Masauda and Nizam Tola. The village has a primary school and a high school half km. west of the village. The primary health centre is 2 kms. far from the village. The college, Post Office, Police Station, Block Office and Irrigation Sub-division Office are situated at Bikram 4 kms west of the village. The nearest Railway station (Bihta) is 17 kms. north of the village. The sub-division (civil) office is situated at 37 kms. from the village in the North east direction at Danapur. The total population of the village according to 1971 census is, 616 (308 male + 308 female) out of which 144 (68 male + 76 female) persons are from scheduled caste community. The occupational



engagement of the population is as follows: Cultivation 100 (all males), Agricultural labour 59 (43 male + 16 female) and two persons are engaged in other services. The number of non-workers are 450 (158 male + 292 female). Out of the total population, 222 (161 male + 61 female) persons are literate in the village. As regard the caste-wise household distribution, 44.8 per cent households consist of Bhumihars, 34.2 per cent of backward castes (Kanhar, Thakur, Kanu, Barahi, Sao and Lohar), and 19.42 per cent of schedule castes.<sup>12</sup>

Total cultivable land in the village (250 acres) is irrigated (239 acres by canal and 11 acres by wells). The number of the wells irrigating land is twelve. The canal irrigation in the village falls under Bikram irrigation sub-division. The R.P. channel flowing parallel to the main canal rises from Bikram "lakh" (lock) and irrigates village's land. Four outlets have been provided for the village each of 6" diameter. There is one VLW (covers another three villages also) under the T and V programme for the village.

Three crops are sown in the village and the rotation is as follows: kharif consisting of paddy, rabi consisting of wheat, pulses and sugarcane. There is no metaled road connecting the village, however, the canal road (unmetaled) links the village with Patna-Arwal Road at Bikram lock.

#### Formation of Telpa Chak Society

With a view to demonstrate the OFD works under Command of Sone system the CAD authorities stepped into to select the sites through Block Development Committees (B.D.C.). In March 1976

the authorities wrote to project officers of Naubatpur and Bikram blocks to select the sites. In B.D.C. (Bikram) meeting, village Telpa (Maner) was proposed for this purpose but the mukhiya of that village refused to take the responsibility telling it was difficult for him to mobilize the farmers of his village. Ultimately the mukhiya of village Telpa (Masauda), Mr. Sidheshwar Prasad Singh showed his interest and took initiative for the purpose and finally village Telpa was selected sometime around March, 1976, for the demonstration of OFD works. The chak and the society of Telpa have passed through two phases via several stages. In the first phase the old chak was formed and in second, the new chak was formed. To reach its completion, the two chaks passed through following stages :

- a) Collective application to the Collector, Patna. His approval and completion of voluntary consolidation of holdings;
- b) Formation of the Samiti and its executive body..
- c) Acreage charges at the rate of 2.5 per cent of land during course of measurement for providing channels, drains and farm roads..
- d) Reallocation of plots in such a manner that they fall in between the irrigation and drainage channels and providing chak roads to fields up to the extent possible.

In the second phase, the farmers of Telpa (Masauda) in written applications to Deputy Director, Sone CADA (April and September 1979) expressed their desire to get the OFD works done on a larger part of land (153.85 acres) in the village and gave their consent to abide by the conditions there in. In response, the Assistant Director, SCADA, Bikram was directed in May 1979 to prepare an estimate for the same.<sup>13</sup> Consequently, the

estimate was prepared after survey of the land and sent for approval and was returned back with some technical objection in July 1980. It was pointed out that the estimate was not prepared in accordance with guide lines given by the office of Superintending Engineer vide its letters dated 19.8.78 and 1.5.79. It was further pointed out that proper enquiries were not conducted at the level of the Deputy Director and no explanation was offered as to why two schemes were prepared for one village. The Deputy Director was asked to send the rectified proposal (the plan and the estimate).<sup>14</sup> In the meantime, farmers of Telpa agreed to follow the new plan by electing an executive body with Sidheshwar Prasad Singh as the president and <sup>the then</sup> Assistant Director Sone CADA as an executive member.<sup>15</sup> The cultivators also agreed to occupy the new consolidated plots of land. Finally, under the supervision of the Junior Engineer, the Amin of Sone CADA measured the land and tentative constructions were done by the beneficiary farmers on their own by Kharif 1980 on the lines of the plan prepared by the Assistant Director. The society followed all the norms of reallocation of holdings, acreage charges, etc., as was done earlier in the old chak.

During one of the field visits in November-December 1980, the President, S.P. Singh claimed that he had spent rupees 2500 from his own pocket for the construction works in the new chak and he intended to recover it from the beneficiary farmers. Many other farmers, who were poor, claimed they invested their labour of several days in the OFD works. However, during a visit in March 1982 a different kind of version came to the



knowledge of one of the authors. According to this version, the President spent his own money in OFD works in the new chak hoping the plan and the estimate of the new chak would be approved by the higher authorities in Patna and the President would adjust his money in the bills of the contract work which he expected to get for the OFD works in the new chak. But as the proposal has been rejected twice he has lost his hope of the recovery of the money. He can not realise it from other beneficiaries because they contributed their labour.<sup>16</sup>

There were 458 plots in the two chaks (see map no.4) prior to formation of chak samiti but now there exist only 93 plots (see map no.5). In the older chak, 5280 ft. of unlined irrigation channel, 4602 ft. of unlined drainage channel and 2310 ft. of farm road were provided costing Rs.37,400, having an average expenditure of Rs.683.72 per acre incurred by Sone CADA.<sup>17</sup> In the new chak the farmers have constructed 8909 ft. of unlined irrigation channel and 8542 ft. of unlined drainage channel. In the estimate of the new chak Rs.3,65,000 has been proposed and so far no money has been invested by SCADA. This estimate includes the cost of land development also.<sup>18</sup> The general slope of the land is 1.5 feet and the direction of the slope is towards south. At the extreme south of the chak, there flows a rainy season river which serves as the main drainage. The average rainfall in the locality is 37.4 inches.

The Bhumihars out number other castes (39 out of 45) in the samiti and own 97.3 per cent of the total land in the chaks. In old chak, the percentage of land owned by Bhumihars is 96.28,



while in new chak they own 96.70 per cent of the land. The remaining land is distributed among Brahmin, Barahi (carpenter), Sahu, Nai (barber) and scheduled caste (only one) members of the Samiti. This indicates that other castes, particularly backward castes, who have significant population in the village do not have much land. In comparison to Tarwan, the average land per member in the chak is much higher (4.62 acres compared to Tarwan's 1.65 acres).

#### Working of the Society

In the old chak the OFD works started functioning since Kharif 1978 while the construction work done by the farmers in the new chak were used for the first time in the Kharif of 1980. In both the phases S.P. Singh and Ramanand Singh have been the President and the Secretary respectively of the Samiti. S.P. Singh is the Mukhiya of the village and is an active member of the CPI and is the son of Gopal Singh, ex-Sattadar of the village. He is educated up to intermediate and runs a medical shop at Bikram and also takes construction contracts. Ramanand Singh is a close friend of S.P. Singh and is very active in the Samiti affairs. He is economically sound having more than 3 acres of land in the village, a house in Bikram put on rent. As already pointed out earlier, Telpa Samiti has not been registered with the co-operative department (till March 1982) and was functioning as an irrigation farmers' organization. According to the Sone CADA authorities, the registration of a society is not a pre-requisite for the OFD works and other benefits from the CADA. According to them the essential

requisite is an organization of beneficiary farmers. In this section, we intend to examine the Samiti's functions in terms of participation, water distribution, maintenance of structures, conflict resolution, social justice and interaction with government departments and agencies.

The members of Samiti did not actively participate. It appeared, since Samiti's inception in 1978 not many meetings were held but the president maintained that "several meetings took place and discussions were always done regarding faults in the formation of the old chak". In the two meetings (April 1979 and September 1979) for the new chak, almost all members were present. In the meetings farmers' enthusiasm for the OFD works to be done by the CADA was noticeable and they agreed for the voluntary consolidation of holdings and other conditional requirements of the CADA for the sake of OFD works. These meetings were general body meetings and no executive body meeting has been held so far.

As regard the distribution of water in the individual fields, the Samiti has not adopted any specific norms and procedures. Upwards to downwards process of distribution of water, which was practised prior to formation of the chak, is still in practice. 1979 had been the year of scarce water supply in the canal and the farmers of Telpa blocked the canal at Bikram lock and availed abundant water. However, the secretary of the Samiti expressed the desire to adopt sound norms of water distribution in future (after the construction work is over). As far as the maintenance of structures is concerned, society

has adopted the following norms: a) Rapid siltation takes place due to kutchha structures so every member falling under command of a certain channel, is committed to desilt it twice a year. If a member does not come to work, he would have to bear the cost of labour; b) The second measure is concerned with repair of the structures. Every member would repair that length of the channel which passes through his chak. After completion of lined structures, the Samiti planned to collect a certain amount of money from beneficiaries and to keep it with the executive body for repair and maintenance. However, nothing was done with regard to adoption of norms and procedures till March 1982. On the contrary, construction works done by Sone CADA or the farmers themselves, were deshaped or obliterated and were not functioning properly. Annoyed with the Samiti, 5 farmers, of which 4 were Bhumihar executive committee members and one was backward caste ordinary member, have given a written application for retaining their plots which they were having before voluntary consolidation of holdings in 1979.

Conflict resolution has been evoked on two occasions. The conflicts took between two tail enders, one Zahar Dusadh and the other Bengali Thakur. On both the times the reason of conflict had been carrying plough through cultivated land which damaged newly sown paddy plants. On both the occasions, the verdict of Samiti's elite was accepted without question. No conflict took place regarding water distribution.

As regard the social justice, the Samiti has not shown any vigour towards imparting the justice to weaker sections.



However, the Samiti has re-allocated the surplus land (surplused out of acreage charges ) to the two marginal farmers. The total land, re-allocated without charges, amounts to 0.12 acres out of which 0.04 acre was given to a scheduled caste member and the rest 0.08 acres was given to a backward member. However, the lands which have been given to them have been at the tail end position in both, old and new chaks.

The Samiti's interaction with government departments and agencies, has not increased to any significant extent since its inception. The Samiti seemed to be mainly interacting with local Sone CADA (Sub-division) office. Informal meetings by executive members of the Samiti with block officials have not been of any worth. As regard the interaction with financial institutions, the Samiti has failed to take any step. The reason may be non-registration of the Samiti with the co-operative department. But the Samiti did not try to be registered. As a result, it could not raise loans nor could propose raising loans for better farming. Actually the leaders, particularly the President was interested in getting OFD works done in the new chak. He spent some of his money hoping to recover it later by taking the contract of the OFD works in the new chak. However, when he found his fond hopes dashing, he became passive and did not take any interest in activating the Samiti.

#### Karup Co-operative Irrigation (Chak) Society

The third chak society, Karup co-operative irrigation (chak) society, which came into being like Tarwan, has also been



investigated to enrich the study. Like the two other villages, this village was also selected for demonstration of OFD works and the farmers of the village were enthusiastic to get the OFD works done by Sone CADA in the shape of subsidy.<sup>19</sup> In this village, Sone CADA had planned to operate on 250 acres of land, but it could operate on only 45.5 acres of land upto the end of 1980 (see map nos.6 and 7). According to Sone CADA officials, Karup village was selected in 1976 for the OFD demonstrations. The plan for the consolidation of holdings in the village was prepared by the Chakbandi (consolidation of holdings) department of the State Government and the OFD works done by the Sone CADA were based on the plan prepared by the Chakbandi department. It was expected that the farmers would occupy their plots in the <sup>new</sup> chak. However, they did not do so because some dispute cases arose. The Agency authorities point out that consolidation of holdings was the main hazard in the completion of OFD works in the chak. An erstwhile Superintending Engineer of the Agency (presently Agricultural Engineer in Bihar Government) lamented, "several times it was insisted on the Chakbandi officials by the Agency to prepare consolidation plans on the lines of irrigation benefits. But the Government did not pay any attention. Although, in several cabinet meetings the idea was accepted but it was never followed. Agency can not do anything beyond giving suggestions." In the second half of 1981 several letters were sent by the Agency authorities to the Chakbandi department of Bihar government concerning consolidation of holdings. In July a letter was sent by the Superintending Engineer Sone CADA to the Director Chakbandi stating that the work of consolidation of

holdings should be completed at the earliest in the villages where OFD works were to be done on the lines of plan prepared by Sone CADA. The plan of about 26 thousand hectares for the OFD works prepared by Sone CADA, was also sent along with this letter. Another letter was sent in August by the Sone Area Development Commissioner to the Director, Chakbandi, Patna suggesting guidelines for consolidation of holdings minor-wise or distributory-wise rather than Panchayat-wise or village-wise. In response to the Superintending Engineer's letter, the Director Chakbandi wrote letters to Deputy Directors, Chakbandi in September 1981 to follow the plans prepared by Sone CADA<sup>20</sup>. "The present stage is only of correspondence and not of actual work", according to the erstwhile Superintending Engineer (interviewed in March 1982).

A remarkable thing about Karup is that the operated area of the village has been selected for Warabandi demonstrations since December 14, 1980 by Sone CADA. However, the OFD works have not been completed to the extent that each plot could get water independently, hence no proportionate water distribution could be made. Warabandi should not have been introduced there in such a situation. Justifying the introduction of Warabandi in Karup, the following reasons were given by the then Superintending Engineer, Water and Soil conservation, Sone CADA, Patna : (i) There was no other place where the Agency could introduce Warabandi at the head reach; (ii) The Government of India was insisting on early introduction of Warabandi and reaching the stage of readiness for the introduction of Warabandi (well planned construction) would have

postponed the introduction of Warabandi by a year or two;

(iii) The proposed plan of Karup was on a largest area.

However, the erstwhile Superintending Engineer in an interview in March 1982 lamented that, "the very policy of the Government is defective. The Government makes haste only in spending money and not in utilising it. The construction work should have been completed and the farmers should have been taught about the essence of Warabandi before the introduction of Warabandi. Hence, Warabandi is only on paper and not in the chak".

#### Salient Features of the Village and The Chak

Karup village is under Seosagar block of Rohtas district. The village is served by Karup-Pipri Gram Panchayat. The village is linked with a metaled road connecting the G.T.National Highway near Beda. The district town Sasaram is about 10 kilometers south-east from the village. The college, the hospital, and the nearest railway station is at Sasaram. The village has a veterinary hospital and a middle school. The block office, police station and BISCOMAUN Local office is at Seosagar 9 kms west from the village.

The total geographical area is 403.32 acres out of which 5.66 is culturable waste and 28.00 acres is uncultivable. The remaining land (369.66) is irrigated by canal, pumpsets, wells and river. According to 1971 census, the total population of the village is 1218 (658 Male + 560 Female), out of which 355 (200 Male + 155 Female) are from scheduled caste community. The number of the literates are 199 (173 Male + 26 Female). The

classification of workers is as follows : Cultivators, 181 (80 Male + 1 Female), agricultural labourers, 27 (all Male), trade and commerce, 6 (all Male) and other services, 54 (all Male). Thus, there are 370 workers, out of which 344 are male. The non-workers are 848 (314 Male + 534 Female). In all, there are about 180 households in the village consisting of Koiri, Nai (barber), Lohar, Kauhar, Brahmin, Teli, Ahir (yadav), Dusadh, Chawar and Dhobi castes. The Koiries, which represent backward caste community (according to Annexure-1 of government of Bihar) constitute 66.29% of social texture of the village. The share of the households of other castes is as follows : Scheduled Caste, 24.30%, Ahir (yadava), 2.76%, Lohar and Kauhar 2.20% each, Nai (barber), 1.10% and Brahmin and Teli, 0.55% each. All Scheduled Castes and 23% Koiri are agricultural labourers.

The canal irrigation of the village is served by Sub-divisional office of Sone project headed by an Assistant Engineer. The Malabar distributory, rising out from high level canal, irrigates the village's land. There is adequate water available in the village because the area falls under the 'headreach' of the distributory. Indigenous sources of irrigation such as Lathakudi<sup>21</sup> and Sair<sup>22</sup> are also in practice in the village, notably Lathakudi which was used even in chak area. There are four pumping sets in the village which are used for fetching water from the river and the ditches.

The chak has been provided with one outlet having capacity of one cusec. The total length, so far constructed, of unlined (Kutchha) irrigation channels is about 6600 ft. The main branch



which has been multi-branched is 1947 ft. Three vertical branches are 495 ft., 528 ft., the third main channel is 1848 ft. long while the remaining is the length of the horizontal channels. The length of the drainage channel (unlined) is 2541 ft. There is no provision of farm road in the chak area. The expenditure so far incurred in the OFD works (including land development) in the chak is Rs.39,000/- making an average expenditure of Rs.857.14 per acre. It is complained by the beneficiaries that vertical channels are not functioning properly because of technical defects in the construction.

#### Formation of the chak society

Although Karup was also one of the villages which was selected in 1976 for OFD demonstrations, but there was no progress of the work for a span of two years. However, one Lal Mohar Singh (not a member of the existing chak society because his land does not fall in the operated area) ex-Sattedar came to know about CADA's OFD works scheme. He coaxed his fellow farmers to step forward and made them attracted towards the scheme. Later, he led them to make contacts with the Assistant Director Sone CADA, Sasaram, who advised them to get registered first. After contacting the local officials of co-operative department, they applied for registration in July 1978. There were 19 members of proposed chak society and the working area was command of channel No.1, 3 and 4. At last, the society was registered in Sept 1978 consisting of 17 members.

The society did not make efforts for voluntary consolidation of holdings because Karup happened to be in the area where

consolidation of holdings was being carried out by the Chakbandi Bibhag (Consolidation Department) of the Government of Bihar. However, the consolidation of holdings has not yet come into being because some dispute cases are yet to be settled by the Chakbandi Directorate, Patna. In the first general body meeting, the society selected Ramjanam Singh (the secretary of the society) as headman to supervise the construction works. The construction of irrigation infrastructure without consolidation of holdings <sup>any reallocation</sup> has not led to/of holdings. Nevertheless the non-consolidation led to multiple branching of channels and irrigation by over-flooding the fields. The CAD authorities were helpless in this matter, consequently, they chose the 'ridges' for the construction of channels as per Government of India advice.<sup>23</sup>

#### Working of the society

the  
After/ completion of OFD works the water was first provided by the newly constructed irrigation structures in Kharif 1979. In the pages to follow, we intend to discuss the working of the society in terms of participation, distributions of water and maintenance of irrigation structures, conflict resolution, social justice, interaction with government departments and agencies as well as other formal responsibilities undertaken by the society.

Although members of the society have met only two times since its inception in October 1978, but the attendance in both the meetings, one general body and the other executive body, was hundred per cent. The first meeting of general body, presided over by one Ramdhari Singh, was held on 2nd October 1978 in

which following tangible results came out : i) the election of the executive body of seven members including Haricharan Singh as president; ii) providing treasurer to keep upto Rs.200 as share capital; iii) delegating the powers of representation to the secretary of the society; and (iv) vesting all the powers pertaining to routine matters in the executive body. The major cause of not holding any meeting, it seemed during one of authors' visit, is that the executive body members of the chak society. In the first executive body meeting held on September 14, 1980 no matter was discussed pertaining to irrigation and agriculture. The proposals were made to make efforts to affiliate the society with the Co-operative Bank Ltd., Sasaram and the Bihar Co-operative federation, Patna. It is remarkable that all the members of the executive committee are Koiri who constitute about 66 households of the village.

As regards the distribution of water to individual fields, the plan has not been made in a way to enable every plot to get water independantly. In the absence of which, field to field (over-flooding the fields) irrigation is being done often. Although Warabandi has been introduced since December 24, 1980, but it was not practised till one of the authors' visit (second fortnight of December 1980). Prior to the Warabandi introduction, the society practiced the old pattern of water distribution. In sequencing of water, 'the greater loss was avoided at the cost of lesser loss'. Such incidence occurred, when the plot-behind the plot adjacent to the channel required water while

adjacent plot did not. In such cases the plot which had costlier crop and in larger area was given preference in irrigation.<sup>24</sup> As far as the maintenance of structures is concerned, some norms have been adopted by the society. For instance, one would be responsible for desilting the channel upto the length of the channel passing through his field. So far the owners of the plots falling beyond channel are concerned, the farmers of the chak have decided to desilt and repair all the channels collectively every year. However, the farmers getting maximum benefits being adjacent to the channels are made responsible for keeping the structures repaired.

As regards the conflict resolution, the society members resolve the conflicts by mutual understanding and reconciliation. Generally five or six members of the chak impartially decide the conflicts and no specific model of conflict resolution has been adopted by the society. However, no conflict regarding water distribution could be discovered by one of the authors when he visited the chak in December 1980.

The society has failed to impart any social justice to the weaker sections of the society. Although they had, in early stage, included a scheduled caste member in the society (who died in early months of 1980). The secretary of the society stressed an ideal intention in this regard but the step appeared to be hollow and was taken only to complete the quorum requirement set by the /Co-operative Department.<sup>25</sup> The society intends to play the role of an intermediary organization by overtaking the responsibilities



of Sattedari system. In all the other two organizations also examined in the foregoing, such type of role was noted. In case of Karup, the society's executive member and ex-sattedar Aliar Singh provides leadership to the farmers in all such matters.

Notes and References

1. Command Area Development Project for Amarapur Sub-Distributory, Kosi (Bihar), prepared by Agricultural Finance Corporation, April 1976, pp.375-378 and 397-400.
2. Model Bye-Laws of Cooperation Irrigation (Chak) Society Ltd., published by Sone CADA.
3. Based on a discussion with the Joint Registrar, Cooperatives, Bihar on 13-2-1980.
4. The account is based on records available at BDO office Naubatpur and office of the Assistant Director, Soil and Water Management, Sone CADA, Phulwarisharif (Patna).
5. Calculated on the basis of figures supplied by the Ex-Sattadar, Mr. Jairam Singh.
6. Same as reference no.4.
7. Telegram from Joint Director, Agriculture of Project Officer, Naubatpur.
8. This section is based on the information obtained from a note entitled, "On-Farm Development Work" (including new concept of land consolidation), village - Tarwan, Block - Naubatpur, District - Patna, prepared by Mr. G.S. Gupta, Assistant Director, Soil and Water Management Sone CADA, Phulwarisharif (Patna).
9. Resolution No.2 of the General Body Meeting of Tarwan Cooperative Irrigation Chak Society on 19-9-1978.
10. Same as reference No.8.
11. The account is based on number of field visits carried out upto December 1980.
12. Calculated on the basis of data supplied by Mr. Gopal Singh Ex-Sattedar of the village.
13. Letter Nos.99 and 336 dated 19-8-1978 and 1-5-1979 from Superintending Engineer, Sone CADA, Patna.
14. Letter from the Superintending Engineer, Sone CADA, Patna to Dy. Director, Water and Soil Conservation, Sone CADA, Khagol, No.624 dated 1-7-1980.
15. The reason for inclusion of the Assistant Director, Sone CADA, Bikram, as an executive member, according to Sidheshwar Prasad Singh, were as follows : (i) to take technical guidance in constructions and, (ii) the notification from the Collector, Patna had not reached and the construction work was needed at the earliest, hence his inclusion because OFD operations could not have been done otherwise.

16. It was pointed out by the Assistant Engineer, Sone CADA, Patna (March 1982), the estimate of the OFD works in the new chak was highly escalated and included the cost of the works which were already done in the old chak.
17. Based on the records available in the office of the Assistant Director, Sone CADA, Vikram.
18. A large piece of land in the village is like a mount ("tilla"). According to the old village folks, it was used as an airport in the times of British rule. For any kind of OFD construction it is essential to develop the land first.
19. In an interview, in the month of November 1981, the Superintending Engineer, Sone CADA, Patna, told that CAD authority makes all expenditure as subsidy in the areas of OFD demonstration, while it may also subsidise the expenditure incurred in other areas in irrigation channels but not in other three works of OFD such as, land development, drainage structures, and approach roads. Sone CADA's target for OFD demonstrations in 1980-81 was 500 ha. (1235 acres).
20. The various letters in this regard are : (i) letter No.653, 30-7-1981 from the office of the Superintending Engineer, Water and Soil Conservation, Sone CADA, Patna; (ii) Letter from ADC, Sone CADA, dated 10-8-1981 to Director Chakbandi; (iii) Letter No.4/31/81 dated 8-9-1981 from Director, Chakbandi to his Deputy Directors.
21. Lalhakudi is a method of fetching water from wells. The same thing is called Dekuli in U.P. eastern districts.
22. Sair is a method of fetching water from ditches and drains. Almost similar thing is called Bedi in central U.P.
23. See, D.O. No.11-10/80 CAD, Government of India, Ministry of Agriculture, New Delhi, April 22, 1980.
24. If the cheaper crop (khesari pulses generally used to feed cattle) stands in a smaller plot adjacent to the channel and wheat in larger plot adjacent to the smaller plot. The wheat would be preferred and the irrigation water would pass through khesari field. Since khesari does not need as much irrigation as wheat does, it may be damaged.
25. The reasons, according to the Secretary, for the inclusion of a landless scheduled caste in the society were as follows : (i) the society had been advised by Cooperative Department to include at least one scheduled caste member; (ii) the society wanted to include an agricultural labourer to impart social justice; and (iii) the society wanted to give him (the landless labourer) the responsibility of resolving conflicts. The old and experienced landless was expected to impart justice impartially.

## CHAPTER IV

### TARWAN AND TELPA THROUGH DATA ANALYSIS

In this chapter we intend to find out the utility of the chak organizations and financial investments made by Sone CADA and farmers themselves. Through the household survey, the 'economic efficiency' of the chaks has been measured in two terms - physical output and value of output. The socio-economic indicators have also been looked because they play an important role in increasing productivity of land and of public investments. It has already been made clear in the previous chapter that the investments made in OFD works in the surveyed chaks were in the shape of subsidies. It should also be mentioned here that the household survey of all the chak members were carried out in two out of three chaks (Tarwan and Telpa) while the remaining one chak (Karup) was not surveyed because of following two reasons :

- I) non-availability of sufficient financial support, and
- II) the society in Karup was in quite a rudimentary stage and had a very small number of farmers. Hence, in this chapter only two chaks have been discussed.

Seventy five households in Tarwan and forty one households in Telpa were interviewed. The number of the households and the number of chak society members may not tally because in the official beneficiary chart of the chaks, even those persons were also included as separate households who, in



fact, were joint. Therefore, the total number of surveyed households is 116 (75 in Tarwan and 41 in Telpa), while the total number of chak members is 122 (77 in Tarwan and 45 in Telpa). As already mentioned in the previous chapter, one of the two chak societies (Tarwan) is registered with the Co-operative Department of Government of Bihar while the other (Telpa) has not been registered.

#### Income, Occupation and Castes

So far the nature of the surveyed households is concerned, more than 70 per cent households in both the chaks are of joint nature. However, in Telpa a bit larger percentage of households is of joint nature. There are 78.04% joint households in Telpa compared to 72% in Tarwan. The chak members are grouped into three age groups : (I) 20 to 35 years, (II) 36 to 50 years, and (III) 51 years and above. It was found that the second group had the largest number of members - 40.54% in Tarwan and 43.90% in Telpa. Lowest number of the members fall under the first age group viz, 18.9% in Tarwan and 26.82% in Telpa. Tarwan has a considerable percentage of members (40.54%) in third age group while in Telpa this group consisted of only 29.26%. In Tarwan, 80.90% of the members were of more than 35 years while 73.16% in Telpa were in this age group.

In terms of the occupational engagement, we find 85.36% in Telpa have cultivation as primary occupation compared to 73.33 in Tarwan. Agriculture labour as primary occupation

has been occupied by 2.43% members of Telpa chak and by 2.66% members of Tarwan chak. The remaining members of both the societies were doing non-agricultural works such as business, service and other works as their primary occupation. Table 4.1 reveals the break up figures of occupational engagement by the income group. All the households have been placed in six income groups per annum which are as follows : 1) upto Rs.2000; 2) Rs.2000 to Rs.4900; 3) 5000 to 9900; 4) Rs.10000 to 14900; 5) Rs.15000 to 19900; and 6) Rs.20000 and above. As regard, the number of farmers engaged in cultivation in the whole Sone command area, the Census of 1971 reveals that 22.24% of total population are cultivators in the command area, while the agricultural labours in the command are 15.38%.<sup>1</sup> It would be note worthy to mention here the caste-wise income distribution. It can be found that higher castes have higher annual income compared with those of the lower castes. The two higher castes (Bhumihar and Brahmin) were more in the higher income groups. In Tarwan 30.66% of members (all Bhumihars) represent the three higher income groups, while 43.90% of members (all Bhumihars) represent the three higher groups of income in Telpa. 52% of members (all backward castes) represent the first three lower income groups in Tarwan whereas only 4.87% of backward castes represent the three lower groups in Telpa. Only two backward caste members in Telpa were from the fifth income group (Rs.15000 to 19900 p.a.). Table 4.2 shows the break up figure of caste-wise income distribution.

Table 4.1

Occupational Status by Income Group

Occupation	Number of households having primary occupation by income group													
	upto 2000		2000- 4900		5000- 9900		10000- 14900		15000- 19900		20000 & above		Total	
	TR	TL	TR	TL	TR	TL	TR	TL	TR	TL	TR	TL	TR	TL
Cultivation	1	-	24	5	16	14	7	7	6	6	1	3	55	35
Agricultural Labour	1	1	1	-	-	-	-	-	-	-	-	-	2	1
Business	-	-	1	-	1	-	-	-	-	-	-	-	2	-
Service and Others	-	-	2	-	5	1	2	-	6	-	1	4	16	5
Total	2	1	28	5	22	15	9	7	12	6	2	7	75	41

TR : Stands for Village Tarwan

TL : Stands for Village Telpa

Table 4.2

Distribution of Caste by Income Group

Castes	Number of members by income group													
	Below Rs.2000		Rs.2000- Rs.4900		Rs.5000- Rs.9900		Rs.10000- Rs.14900		Rs.15000- Rs.19900		Rs.20000 & above		Total	
	TR	TL	TR	TL	TR	TL	TR	TL	TR	TL	TR	TL	TR	TL
Bhumihar	-	-	10	4	16	13	9	7	12	7	2	4	49	35
Brahmin	-	-	3	-	2	1	-	-	-	-	-	-	5	1
Backward- Castes	2	-	15	1	4	1	-	-	-	2	-	-	21	4
Scheduled Castes	-	1	-	-	-	-	-	-	-	-	-	-	-	1
All Castes	2	1	28	5	22	15	9	7	12	9	2	4	75	41

TR : Stands for Village Tarwan

TL : Stands for Village Telpa

### Distribution of Holdings

Now we turn to land distribution by size of holdings. The size of land holdings has been classified into four folds - marginal holdings (upto 2.5 acres), small holdings (2.5 to 5 acres), medium holdings (5 to 10 acres) and large holdings (above 10 acres). In the earlier chapter it has been stressed that the Bhumihar caste dominated in both number and landed property in the two chaks. The highly inequitable distribution of holdings is the character of not only Sone command area but also Kosi command area in Bihar and in the state itself<sup>2</sup>. The marginal land holdings, in number, constitute 60% to 70% in Sone command area and cover only 15% to 20% of total cultivated land in the area. The smaller holdings constitute 15% to 18% in number in the command area covering 12% to 15% of the net cultivated land in Sone command area. About 70% of the area cultivated is owned by the two larger categories (medium and large) of holding size which, in number, share only about 20% of the total holdings<sup>3</sup>. Similar trend can be found in the studied villages. Tables 4.3 and 4.4 reveal the clear picture of distribution of holdings. We will first look into the trend of distribution of holdings in the chak areas of both the villages. 78.66% of total number of holdings fall under marginal size in Tarwan chak while 41.46% in Telpa chak. But as regard the coverage of net cultivated land, 35% land in Tarwan is under marginal holding size while 8.61% in Telpa. 13.34% of the



small holdings constitute 28.85% of cultivated land in Tarwan while 29.27% of the holdings constitute 30% of cultivated land in Telpa. Medium holdings are 8% in Tarwan constituting 36.15% of the cultivated area while in Telpa, 24.39% of the holdings cover 44.26% of the cultivated land. There is no large holding in Tarwan chak. However, 4.88% of such holdings constitute 17.13% of the cultivated land in Telpa. If we look into distribution of irrigated land outside chak area, there is a slight variation in the percentage of distribution of holdings and distribution of land by holding as compared to chak area. However, the trend of inequitable distribution is in the same direction. 54.41% of the holdings belong to marginal size consisting of 23.92% of cultivated land in Tarwan while 75% marginal size holdings in Telpa constitute 29.40% of cultivated land. In small land holding size group, the percentage of holdings in Tarwan is 27.94% sharing 27.15% cultivated land whereas in Telpa 10.71% of holdings covers 16.07% of total cultivated land. The percentage of numbers of holdings under medium and large sizes is 17.65% in Tarwan consisting of 48.93% of the cultivated land and it is 14.29% of total number of holdings constituting 54.52% of cultivated land in Telpa. On the basis of the data in tables 4.3 and 4.4 two things emerge very clearly. First in both the chaks the smaller holdings though representing greater number constitute smaller proportion of the area in the chaks and this is more pronounced in Telpa chak. Second, the average size of land per household is much larger in Telpa (5 acres) compared to Tarwan (1.69 acres)<sup>4</sup>.

Table 4.3A

Distribution of Holdings by Class of Land in Tarwan

	(Area in acres)						
Size of Holding	ICH		OCHI		OCH (UI)		Total land in village
	Area	No. of h/h	Area	No. of h/h	Area	No. of h/h	
Below 2.5 (Marginal)	44.46 (35.00)	53 (78.66)	50.88 (23.92)	37 (54.41)	11.25 (34.62)	18 (72.00)	106.59 (28.64)
2.5 to 5 (Small)	36.63 (28.85)	10 (13.34)	57.77 (27.15)	19 (27.94)	7.25 (22.30)	5 (20.00)	101.65 (27.30)
5 to 10 (Midium)	45.91 (36.15)	6 ( 8.00)	55.21 (25.94)	8 (11.77)	14.00 (43.08)	2 ( 8.00)	115.12 (30.92)
Above 10 (Large)	Nil	Nil	48.93 (22.99)	4 ( 5.88)	Nil	Nil	48.93 (13.14)
Total	127.00 (100)	75 (100)	212.79 (100)	68 (100)	32.50 (100)	25 (100)	372.29 (100)

ICH : In chak, OCH(I) : Outside chak irrigated and I  
 OCH (UI) : Outside chak unirrigated, h/h :household.  
 Figures in bracket show the percentage.

Table 4.3B

Distribution of Holdings by Class of Land in Telpa

Land Holding Size	(Area in acres)				Total Land
	ICH		OCH(I)		
	Area	No. of h/h	Area	No. of h/h	
Below 2.5 (Marginal)	17.95 ( 8.61)	17 (41.46)	14.02 (29.41)	21 (75.00)	31.97 (12.49)
2.5 to 5.00 (Small)	62.49 (30.00)	12 (29.27)	7.66 (16.07)	3 (10.71)	70.15 (27.40)
5.00 to 10 (Medium)	92.21 (44.26)	10 (24.39)	15.66 (32.85)	3 (10.71)	107.87 (42.13)
10 (Large)	35.70 (17.13)	2 ( 4.88)	10.33 (21.67)	.1 ( 3.58)	46.03 (17.98)
Total	208.35 (100)	41 (100)	47.67 (100)	28 (100)	256.02 (100)

Note : There is no unirrigated land in the village  
 ICH stands for In Chak land while OCH(I) stands for  
 outside chak land irrigated, h/h : household  
 Figures in brackets show the percentage.

Table 4.4A

## Yield Per Acre of Major Crops (Quintals Per Acre) in Tarwan

Crops	Marginal Holdings (Upto 2.5 Acres)				Small Holdings (Upto 5 Acres)				Medium Holdings (5 to 10 Acres)				Larger Holdings (Above 10 Acres)				All Holdings			
	In		Out-		In		Out-		In		Out-		In		Out-		In		Out-	
	Chak	side	Chak	side	Chak	side	Chak	side	Chak	side	Chak	side	Chak	side	Chak	side	Chak	side	Chak	side
	(I)	(UI)	(I)	(UI)	(I)	(UI)	(I)	(UI)	(I)	(UI)	(I)	(UI)	(I)	(UI)	(I)	(UI)	(I)	(UI)	(I)	(UI)
<b>KHARIF</b>																				
Paddy	8.13	7.45	5.00	10.16	8.00	5.00	10.40	8.06	5.30	-	8.80	5.12	9.56	8.07	5.10					
Sugarcane	-	-	3.00	-	4.00	3.00	-	4.00	3.50	-	-	3.50	-	4.00	3.25					
<b>RABI</b>																				
Wheat	5.40	4.37	-	5.60	5.00	-	5.86	5.00	3.50	-	4.78	3.50	5.62	4.78	3.50					
Pulses	1.00	0.95	0.75	-	1.00	0.66	1.03	0.90	0.70	-	1.25	0.68	1.00	1.02	0.69					
Maize	-	-	-	6.60	-	-	-	-	-	-	-	-	6.60	-	-					

Table -4.4B

Yield Per Acre of Major Crops (Quintals Per Acre) in Telpa

Crops	Marginal Holdings (Upto 2.5 Acres)			Small Holdings (Upto 5 Acres)			Medium Holdings (5 to 10 Acres)			Larger Holdings (Above 10 Acres)			All Holdings		
	In	Out-	Out-	In	Out-	Out-	In	Out-	Out-	In	Out-	Out-	In	Out-	Out-
	Chak (I)	side Chak (I)	side Chak (UI)	Chak (I)	side Chak (I)	side Chak (UI)	Chak (I)	side Chak (I)	side Chak (UI)	Chak (I)	side Chak (I)	side Chak (UI)	Chak (I)	side Chak (I)	side Chak (UI)
<u>KHARIF</u>															
Paddy	9.00	7.00	-	10.00	10.00	-	9.72	8.40	-	9.40	8.50	-	8.53	8.47	-
Sugarcane	-	4.00	-	5.50	4.50	-	-	5.30	-	5.50	-	-	5.55	4.60	-
<u>RABI</u>															
Wheat	5.30	5.00	-	6.70	6.50	-	5.75	5.00	-	6.00	5.25	-	5.93	5.43	-
Pulses	-	1.00	-	-	1.00	-	1.00	1.00	-	-	1.00	-	1.00	1.00	-
Potato	-	10.00	-	10.00	10.00	-	-	-	-	-	-	-	10.00	10.00	-



Before we start with input-output (cost and productivity) analysis, it would be worthwhile to point out that highly inequitable distribution of land ownership is characterised by large scale leasing out of land by the bigger agricultural households in the Sone command area. Such a large scale tenancy system does not prevail in the villages we studied. However, the leasing out trend in shape of share-cropping and contract cropping was visible even in the chak areas of both the villages. Five members of Telpa and 14 members of Tarwan societies were found not cultivating their land by their own and leasing it out to other chak members or farmers. There are three different rates of rent of share cropping and contract cropping in the Sone command area - first; where the tenants pay the fifty per cent of the total produce to the owner of land but charge fifty per cent share in the cost of non-traditional inputs such as fertilizers, seeds, pesticides and water charges; second, where 6 to 7 quintals of rice per acre annually is paid by the tenants to the owner of land without charging any share in input cost; and third, where a lumpsum amount varying from Rs.700 to 900 per acre is paid yearly to land owner by the tenants. The latter two systems are called 'Mani' and 'Nagadi'<sup>5</sup> (contract cropping) respectively.

### Productivity

An important benefit of irrigation and better farm management is the increase in productivity, particularly in terms of yield out-put per hectare/acre. Therefore, it is very logical

to judge the effectiveness of the OFD Works in the chak areas in relation to productivity and compare it with the productivity of the irrigated land outside the chak areas. The two major crops in the areas of study are Kharif paddy and Rabi wheat. The other crops grown in the areas are, pulses, sugarcane, maize and potato. Taking the two major crops in two consideration and taking the productivity of the two chaks together, (from tables 4.4A and 4.4B) we find that the small land holding size (2.5 to 5 acres) is the most optimum size in terms of productivity in the chak areas while the marginal land holding size (less than 2.5 acres) is the least productive size. As regards the productivity of paddy in the chak area, tables 4.4A and 4.4B reveal the following per acre productivity in different size land holdings : 9.5 quintals in marginal size, 10.08 quintals in small size, 10.06 quintals in medium size and 9.40 quintals in large size. The productivity of wheat in the chak areas (taken together) reveal the similar trend, which is as follows : 5.35 quintals in marginal size, 6.15 quintals in small size, 5.81 quintals in medium size and 5.39 quintals in large size. The marginal size has the lowest productivity. One reason for the lowest productivity in the marginal holding is the lowest investment in non-traditional inputs (see tables 6A and 6B) compared to all other holding sizes. In his Kosi study Prashad also finds similar trend and points out : "The low level of performance of the very small cultivators is to be mainly explained in terms of their financial weakness"<sup>6</sup>. Financial weakness explanation appears to be

correct because in terms of intensity of cropping the marginal holding size has the highest percentage (tables 4.7A & 4.7B). This means that the marginal farmers because of lack of financial resources are not in a position to make best investments in their land but they make the best use of their labour when it comes to gross cultivation in their land.

Taking the productivity of the two chaks separately in terms of two major crops of paddy and wheat, we find in Tarwan (table 4.4A) the medium holding size (5 to 10 acres) is the optimum size in terms of productivity but in case of Telpa (4.4B) it is the small holding size (2.5 to 5 acres) which is optimum. Further, Tarwan's medium holding has the maximum paddy productivity (10.40 quintals) compared to Telpa's small holding which has the maximum productivity of 10 quintals per acre. However, it is reversed in case of wheat where Telpa's small holding has the maximum productivity of 6.70 quintals compared to Tarwan's medium holding's highest productivity of 5.86 quintals.

Without illustrating the productivity of irrigated land outside chak areas, the economic efficiency of OFD Works can not be judged. The average yield rate of total food grains (i.e., paddy, wheat and pulses in the irrigated land outside the chak areas in two villages is 14.90 quintals per acre in Telpa (15.46 quintals in chak area) and 13.87 quintals per acre in Tarwan (16.18 quintals in chak area). The average yield of paddy and wheat in different land holding groups is



greater in chak areas compared to non chak irrigated areas (see tables 4.4A and 4.4B) except in case of paddy in small land holding group in Telpa where the yield of 10 quintals per acre in chak and irrigated non chak areas is equal. The average yield of total food grains in the irrigated areas outside the chaks in two villages, when taken together, comes to 14.38 quintals per acre compared to 15.84 quintals in the two chak areas taken together. The differences in yields in the chak and non-chak areas, however, are more pronounced in Tarwan than in Telpa. It is clear that the increase in productivity is greater in Tarwan than that in Telpa (we are not taking in to account the commercial crops such as sugarcane and potato, for this purpose). The break-up figures of increase in productivity by land holdings size is clear in table 4.5. If we see as a whole the rise in productivity of paddy in Tarwan is 21.71% and the rise in wheat is 17.5%, while in Telpa, the rise in paddy is 13.71% and in wheat the rise is 9.58%. Thus, there is an overall increase of 19.34% in Tarwan compared to a rise of 11.64% in Telpa.

Table 4.5

Ratio of Rise in Productivity (in percentage)  
In Major Crops in Chak Compared to Outside Chak (I)

Crops	Village	Size of Holdings				
		MR	SM	MD	LR	All
Kharif	Tarwan	9.12	27.00	29.03	-	21.71
Paddy	Telpa	28.57	0.00	15.71	10.58	13.71
Rabi	Tarwan	23.56	12.00	17.20	-	17.52
Wheat	Telpa	6.00	3.07	15.00	14.28	9.58
Paddy	Tarwan & Telpa	18.84	13.50	22.37	10.58	16.32
Wheat	Tarwan & Telpa	14.78	7.53	16.10	14.28	13.17

MR = Marginal (below 2.5 acre), SM = Small (2.5-5),  
 MD = Medium (5 -10), LR = Large (above 10).



The foregoing account gives an indication of the technical efficiency of the two chak samitis. This is revealed in two counts. First, there are marked differences in the productivity of the chak areas and the irrigated land outside chak areas in two villages indicating greater productivity in chak areas in the two villages. Second, the productivity in Tarwan chak is greater than that in Telpa chak. Here a relevant question to ask is ; whether or not these productivity gains are due to the formation of irrigation farmer organizations in the two chaks and greater investment of what Nair calls "human capital component"<sup>7</sup> in Tarwan compared to Telpa? The answer to this question is in affirmative to a partial extent. In Tarwan, the society coaxed its members to use modern agricultural inputs for greater productivity. As a result, greater proportion of modern inputs are used in the chak area compared to outside chak through irrigated area. A particular type of HYV seed ("Sita") has been used in the chak area which gives higher yield and has a shorter period of standing in field compared to any other seed used in the village. The society has created an environment for using HYV seeds and varying amount of chemical fertilizers for almost all crops (see tables 4.6A and 4.6B). The rise in case of Telpa has not been caused to that extent by the formation of chak samiti. Here the quality of land has also played a decisive role. The land on the right bank (south bank where the chak exists) of the main canal is more fertile compared to the land on left (northern) bank of the canal.

Further, the farmers of Telpa never faced the scarcity of water, the way Tarwan farmers faced in 1979 (see chapter III). However, the role of Telpa samiti can not be denied altogether. It did try to check over use of water at head reaches so that the tail-enders get more water. With regard to the second part of the question concerning the role of "human capital component" in Tarwan, we have no doubt, this component is very much there in Tarwan (see chapter III).

Let us compare our findings with the findings of some other studies and see if there is any commonness or consistency in various findings. A study of Punjab by Bhalla and Chanda reveals that per acre yield of rice is the lowest (equivalent to Rs.941.33) in the marginal holdings (below 2.5 acres) and the highest (equivalent to Rs.1231.31) in the largest holding size (above 2.5 acres) and the increase is gradually with the increase in size of holding<sup>8</sup>. A study of the Sone Command Area conducted by Pandey and Muthana reveals that the lowest size of land (average operational land per household 0.73 acres) consisting of "poor peasantry" has the lowest productivity of 6.5 quintals per acre for Kharif paddy. The highest yield rate for the same crop is 9.24 quintals from the average operational land of 5.79 consisting of "big and medium peasantry". However, we find a reversal in the trend when we examine the productivity Rabi wheat. Here the "poor peasantry" (average land 0.73 acres) has the highest productivity of 6.89 quintals of wheat per acre compared to the

Table 4.6A

## Households Using Fertilizers, Improved Seeds and Pesticides in Taiwan

Size of Holdings (Acres)	Number and Percentage of Fertilizers Users				Number and Percentage of Improved Seed Users				Number and Percentage of Users of Pesticides/Insecticides			
	ICH No.	ICH %	OCH(I) No.	OCH(I) %	ICH No.	ICH %	OCH(I) No.	OCH(I) %	ICH No.	ICH %	OCH(I) No.	OCH(I) %
Upto 2.5	46	95.83	19	62.5	47	100	11	37.93	2	4.25	3	10.34
2.5 to 5	8	100	17	100	8	100	17	85.00	2	25.00	3	15.00
5 to 10	6	100	6	100	6	100	5	83.00	2	33.30	Nil	-
Above 10	Nil	-	3	100	Nil	-	3	100	Nil	-	Nil	-
Total	60	98.56	45	78.94	61	100	36	62.06	6	9.83	6	10.50

Table 4.6B

## Households Using Fertilizers, Improved Seeds and Pesticides in Telba

Size of Holdings	Number and Percentage of Fertilizers Users				Number and Percentage of Improved Seed Users				Number and Percentage of Users of Pesticides/Insecticides			
	ICH No.	ICH %	OCH(I) No.	OCH(I) %	ICH No.	ICH %	OCH(I) No.	OCH(I) %	ICH No.	ICH %	OCH(I) No.	OCH(I) %
below 2.5	12	92.30	13	72.22	13	100	10	58.82	Nil	Nil	1	5.88
2.5 to 5	11	100	3	100	11	100	3	100	3	27.27	1	33.33
5 to 10	10	100	3	100	10	100	3	100	Nil	Nil	Nil	Nil
above 10	2	100	1	100	2	100	1	100	Nil	Nil	Nil	Nil
Total	35	97.22	20	80	36	100	17	68	3	8.33	2	5.55



lowest productivity of 6.73 quintal per acre in the "poor middle peasantry" group having an average operational land holding of 3.65 acres. Another noticeable feature of the productivity is that the differences in highest and lowest productivity are significant in case of Kharif paddy (2.74 quintals per acre) compared to Rabi wheat (0.16 quintals per acre)<sup>9</sup>. Thus, the findings of various studies do not provide a unidimensional trend leading to a clear cut relationship between land holding size and productivity.

The yield rate of studied chak area is 9.67 quintals per acre for paddy and 5.67 quintals per acre for wheat, which is higher than the average yield rate of India, Bihar and Kiul, Chandan, Badua Command Area. The average yield rate for the state of Bihar is 5.49 quintals per acre for paddy and 4.69 quintals for wheat<sup>10</sup>. For KCB Command area the yield is 6.29 quintals for paddy and 4.06 quintals for wheat<sup>11</sup>. The average yield rate of paddy and wheat in the studied chak areas has also crossed the all India average yield rate of 4.35 quintals of rice per acre (equivalent to nearly 7 quintals of paddy) and 5.52 quintals per acre of wheat<sup>12</sup>. However, the yield rate of chak areas is lower than the yield rate in Punjab which in 1975-76 was 9.60 quintals per acre for wheat and 11.14 quintals per acre for paddy<sup>13</sup>.

It is widely accepted that the rise in use of HYV seeds and bio-chemicals broadens the productivity range. Nair concludes "the modern inputs like fertilizers, pesticides and

insecticides ... contributed significantly to the crop output in Indian agricultural sector"<sup>14</sup>. Meller has also stressed that the increase in growth of output in Indian agriculture has been substantially due to the use of chemical fertilizers and other HYV inputs<sup>15</sup>. However, we must bear in mind the use of these modern inputs is restricted to areas which have an assured irrigation. Therefore, it would be relevant to examine, to what extent the farmers in different land holding groups and between chak and non-chak areas use these modern inputs. The percentage of users of chemical fertilizers (see Tables 4.6A & 4.6B) is 98.36% in Tarwan chak compared to 97.22% in Telpa chak. Whereas the percentage of users in the irrigated areas outside chak is 78.94% in Tarwan and 80% in Telpa. The difference between users of chemical fertilizers in chak and outside chak areas varies by 19.42 in Tarwan and 17.22% in Telpa. If we examine the users by holding size we find the only noticeable difference among users in the category of marginal farmers. Their percentage as users is 95.83 in Tarwan and 92.30% in Telpa as against 62.5% non chak users in Tarwan and 72.22% non-chak users in Telpa in the same land holding group. In other groups the users are cent per cent in chak as well as outside chak in Tarwan and Telpa. Almost similar trend is noticeable when we examine the improved seeds users (we have included local improved seeds as improved seeds). It is obvious from the tables (4.6A & 4.6B) that cent per cent chak members in both the villages use improved seeds compared to 62.06% users in outside chak area in Tarwan and 68% in Telpa.

Here again the difference among users and non users is in the category of marginal farmers (below 2.5 acres). In Tarwan 37.93% and in Telpa 58.82% farmers use improved seeds in this category compared to hundred per cent users in Tarwan and Telpa chaks in this land holding group. Pesticides/insecticides have been used by very little percentage of farmers in both the villages. In Tarwan village, 9.83% of the chak members used pesticides while 10.5% of farmers used pesticides in the irrigated land outside chak, compared to 8.33% in Telpa chak and 5.55% in land irrigated outside chak in Telpa. The tables, 4.6A and 4.6B reveal that lowest land holding size has the lowest percentage of users of modern inputs in both the village. This, as we have already pointed out must be on account of their financial weakness.

The number of users can not satisfy the thirst of productivity of land but the appropriate quantity can. Pandey<sup>16</sup> has stressed that the standard dose of fertilizer is 57.2 Kg. per acre for paddy and 80.90 Kg. per acre for wheat. However, tables 4.7A & 4.7B reveal that in Tarwan chak area the average per acre use of fertilizer is 31.5 Kg. for paddy and 49.70 Kg. for wheat compared to 45.31 Kg. for paddy and 59.82 Kg. for wheat in Telpa chak. The per acre use of fertilizers in the land irrigated outside chak is 26.55 Kg. for paddy and 37.07 Kg. for wheat in Tarwan and 40.68 Kg. for paddy and 43.75 Kg. for wheat in Telpa

Table 4.7A

Use of Fertilizers Per Acre in Major Crops (Kg. Per Acre) in Tarwan

Crops	Land Holding Class	Land Holding Size			All Holdings
		below 2.5	2.5 to 5.00	5.00 to 10.00 above 10	
PADDY	ICH	26.17	32.10	36.25	31.50
	OCH(I)	25.77	26.75	27.20	26.55
	OCH(U)	-	-	-	-
	Total	25.97	29.42	31.72	29.02
WHEAT	ICH	38.75	43.55	52.00	49.70
	OCH(I)	33.75	37.00	38.75	37.07
	OCH(U)	-	-	-	-
	Total	36.25	40.27	45.37	43.38



Table 4.7B

## Use of Fertilizers Per Acre in Major Crops (Kgs. Per Acre) in Telpa

Crops	Land Holding Class	Land Holding Size				All Holdings
		below 2.5	2.5 to 5.00	5.00 to 10.00	above 10	
PADDY	ICH	25.00	60.00	51.05	45.00	45.37
	OCH(I)	Nil	60.00	30.80	31.25	40.68
	OCH(U)	-	-	-	-	-
	Total	25.00	60.00	40.92	38.12	43.02
WHEAT	ICH	32.50	80.00	55.00	72.00	59.87
	OCH(I)	25.00	60.00	40.00	50.00	43.75
	OCH(U)	-	-	-	-	-
	Total	28.75	70.00	47.50	61.00	51.81
SUGARCANE	ICH	-	30.00	-	30.00	30.00
	OCH(I)	-	-	30.00	-	30.00
	OCH(U)	-	-	-	-	-
	Total	-	30.00	30.00	30.00	30.00

### Intensity of Cropping

One of the most immediate benefits of an irrigation provision is the scope that it offers to the cultivators for practising double and multiple cropping. Tables 4.8A & 4.8B show that the intensity of cropping in Tarwan is 200.53% compared to 196.85% in irrigated land outside the chak area. In Telpa, the intensity of cropping in the chak is 199.25% compared to 193.58% in land irrigated outside the chak. However, the cropping intensity varies in land holding groups. In Tarwan chak the holding wise cropping intensity is as follows : 201.6% in marginal holdings and 200% in small and medium holdings (there is no land in large group in Tarwan chak) compared to 196.5% in marginal, 198.6% in small, 200% in medium and 192.3% in large holdings of the irrigated land outside the chak. The holding wise intensity of cropping in Telpa chak area is, 200% in marginal, 197.72% in small, 200% in medium and large holdings compared to 200% in marginal, 183.33% in small, 190.99% in medium and 200% in large holdings in the irrigated land outside the chak. Prior to the formation of Tarwan chak society, the cropping intensity of the village was 172%<sup>17</sup>. The crop intensity of both the villages in chaks as well as outside chaks is greater than the intensity of cropping of 165% in the whole command area<sup>18</sup> and the intensity of cropping of Bihar State, which is 130.20%.

Table 4.8A

Net Area Sown, Gross Area Sown and Intensity  
of Cropping by Land Size (Tarwan)

Land Holding Size	N.A.S.	G.A.S.	Intensity of Cropping (%)
<hr/>			
below 2.5			
ICH	44.46	89.39	201.6
OCHI	45.86	90.11	196.5
OCHUI	11.25	18.66	166.7
Total			
<hr/>			
2.5 - 5			
ICH	36.63	73.63	200.0
OCHI	57.77	113.04	198.6
OCHUI	7.25	13.77	191.0
Total			
<hr/>			
5 to 10			
ICH	45.41	90.82	200.0
OCHI	55.21	110.42	200.0
OCHUI	14.00	23.22	175.0
Total			
<hr/>			
above 10			
ICH	Nil	Nil	Nil
OCHI	48.93	93.94	192.3
OCHUI	Nil	Nil	Nil
Total			
<hr/>			

200.53% in chak

196.85% outside chak

Table 4.8BNet Area Sown, Gross Area Sown and Intensity of Cropping (Telap)

Land Holding Size	Class of Land	Net Area Sown	Gross Area Sown	Intensity of Cropping (%)
2.5	ICH	17.95	35.90	200.00
	OCH	14.02	28.04	200.00
2.5 - 5	ICH	62.49	123.56	197.72
	OCH	7.66	14.05	183.33
5 - 10	ICH	92.21	184.42	200.00
	OCH	15.66	29.91	190.99
10	ICH	35.70	71.40	200.00
	OCH	10.33	20.66	200.00

199.25% in chak

193.58% outside chak



### Price Efficiency and Inputs

'Price efficiency' is significant in agricultural industry. We can call a farm price efficient, if it maximizes profit per net income i.e. it equates the value of the marginal product of each variable input to its price<sup>20</sup>. It is evidently clear from the tables 4.9A & 4.9B that the rise of non-traditional (NT) inputs has greater impact on productivity of both wheat and paddy crops. In the chak area of Tarwan (table 4.9A) the value of per acre yield of paddy is Rs.956.33 against an investment of Rs.183.80 on NT inputs, while in Telpa chak area the value of per acre yield of paddy is Rs.953.00 against NT inputs of Rs.203.96. For wheat crop in Tarwan chak, the per acre average yield value is Rs.702.33 and the cost on NT inputs is Rs.210.15, while in Telpa chak the yield value is Rs.741.70 against the value of NT inputs of Rs.250.17. If we look into the value of average yield in land outside chak, in Tarwan, we find that the yield value is Rs.821.25 for paddy against the NT inputs of Rs.150.28, while in Telpa average yield value of paddy is Rs.847.00 and the value of NT inputs is Rs.186.57. In case of wheat the average yield rate in value terms is Rs.598.25 against the NT inputs value of Rs.175.56 in the irrigated Tarwan land outside the chak, while in Telpa the average yield rate value is Rs.679.50 against the cost of NT inputs of Rs.201.10. If we compare it with a study done in Kanpur district of Uttar Pradesh, we find that the average value of the yield per acre for wheat is Rs.1440.00 against NT inputs investment of Rs.246.55 and average per acre yield rate

Table 4.9A

Average Yield and Value of NT Inputs Per Acre  
Cropwise (Tarwan)

Crop	Class of Land	Marginal (below 2.5)	Holding Size			Total	(Value in Rs.)
			Small (2.5 to 5)	Medium (5 to 10)	Larger (Above 10)		
Paddy Yield	ICH	813	1016	1040		956.33	
	OCH(I)	745	800	860	880	821.25	
	OCH(U)	500	500	800	512	578.00	
NT Input	ICH	170.47	185.80	195.15	-	183.80	
	OCH(I)	143.39	152.70	146.54	158.50	150.28	
	OCH(U)	45.00	45.00	45.00	45.00	45.00	
Wheat Yield	ICH	675	700	732		702.33	
	OCH(I)	546	625	625	597	598.25	
	OCH(U)	-	-	437	437	437.00	
Input	ICH	200.25	205.81	224.40	-	210.15	
	OCH(I)	168.25	175.40	179.36	179.25	175.56	
	OCH(U)	-	-	83.40	83.40	83.40	
Pulses Yield	ICH	150.00	-	154.50		150.25	
	OCH(I)	142.05	150.00	135.00	187.00	153.51	
	OCH(U)	112.50	99.00	105.00	102.00	164.63	
Input	ICH	15.00	15.00	17.50		15.83	
	OCH(I)	15.00	15.00	15.00	18.80	15.95	
	OCH(U)	15.00	15.00	15.00	15.00	15.00	

Note : Inputs include Fertilizer, Seeds, Pesticides/Insecticides and Water Charges.

Table 4.9B

Average Yield and Value of Non-Traditional Inputs  
Per Acre of Major Crops (Telap) (in Rs.)

Crop	Land Holding Type	Land Holding Size			Total
		Marginal (below 2.5)	Small (2.5 to 5)	Medium (5 to 10)	
PADDY	Yield in ICH	900.00	1000.00	972.00	953.00
	OCH(I)	700.00	1000.00	840.00	847.00
	Total				
PADDY	Non-Traditional Input (Rs)	159.07	236.07	217.37	203.96
	Yield in ICH	89.08	229.08	164.84	186.57
	OCH(I)				
WHEAT	Total				
	Yield in ICH	662.00	837.50	718.75	741.70
	OCH(I)	625.00	812.50	625.00	679.50
WHEAT	Total				
	Non-Traditional Input (Rs)	190.17	278.87	239.67	250.17
	Yield in ICH	159.76	236.76	192.76	201.10
WHEAT	OCH(I)				
	Total				
	Yield in ICH	-	1050	-	1075.00
SUGARCANE	OCH(I)	800	900	1060	920.00
	Total				
	Yield in ICH	-			
SUGARCANE	OCH(I)	47	135.50	-	136.00
	Total				
	NT Input (Rs)		87.00	134.70	89.56



value for paddy is Rs.847.36 against NT input value of Rs.127.08<sup>21</sup>. The profit of cropping in wheat is lesser in our studied area than in Kanpur district but the profit in paddy is greater in the area of our study than that in Kanpur. Hitherto the accepted assumption was that "paddy goes with poverty" but now the day has come to the assumption, "paddy goes with prosperity"<sup>22</sup>. To conclude, the areas of our study reveal the characteristics which are not different from the general agrarian characteristics of Bihar. The uneven pattern of land distribution is discernable in the areas of our study. A handful of big farmers own a large amount of land while a large number of marginal farmers own a small amount of land. As regard the productivity, efficiency and the effectiveness of OFD investments are concerned, the following is a sum up:

- (I) The small/medium holding size is optimum size in terms of productivity.
- (II) There has been a good rise in per acre productivity in chak areas(irrigated).
- (III) The cause of rise in productivity is mainly due to two reasons - rise in non traditional inputs and provision of managerial component by the Samiti.
- (IV) It is evidently clear that human capital component is more conspicuous in Tarwan compared to Telpa.
- (V) Financial weakness seems to be the major constrain for marginal farmers in the raising the volume of modern inputs thereby affecting their productivity adversely.



### Notes and References

1. Annual Progress Report 1978-79, Sone Command Area Development Agency, Patna.
2. For details see : (I) Bihar Through Figures, 1977, Directorate of Statistics and Evaluation, Bihar, p.60; (II) Pradhan H. Prasad, "Economic Benefits in Kosi Project", A.N. Sinha Institute of Social Studies, Patna, July, 1979, pp.6-7; (III) M.P. Pandey and Ann Muthana; "Sone Command Area : Problems and Prospects", Naya Prokash, Calcutta, 1980, pp.24-25; (IV) N. Pant, "Management of Major Canal Systems in Bihar (A Kosi Case)", paper presented in the workshop on "Room for Manoeuvre in Public Policy" IDS at University of Sussex, Brighton, December 17-19, 1980.
3. Annual Progress Report 1978-79 op cit.
4. The official beneficiary chart mentions 77 households in Tarwan and 45 in Telpa. But in reality there are 75 households in Tarwan and 41 in Telpa. Here the average size has been calculated on the basis of **actual** households in two chaks unlike chapter III where the average size of land has been calculated on the basis of official beneficiary chart.
5. 'Mani' is a local term which stands for rent payable in kinds while Nagadi stands for rent payable in cash.
6. Pradhan H. Prasad, "Economic Benefits in Kosi Command Area", op. cit., p.17.
7. N.K. Nair, "Productivity Trends in the Indian Agricultural Sector" (Memo) National Productivity Council, Productivity House, Lodi Road, New Delhi 1978. Nair asserts on page 55 : "The constituent elements of this human capital component are well known, like the increased education and skills of farm population, imparted either through formal institutional agencies or through informal sources like learning by doing, increased technical and managerial knowledge brought about by agricultural research, extension and training schemes etc."
8. G.S. Bhalla and G.K. Chadda, "Structural Changes in Income Distribution : A Study of the Impact of Green Revolution in the Punjab" (Memo) Centre for the Study of Regional Development, School of Social Sciences, Jawahar Lal Nehru University, New Delhi, Nov. 1981, p.66.

9. M.P. Pandey and Ann Muthana; op cit, tables 11 (p.64), 16 (p.69) and 20 (p.79).
10. Bihar Through Figures 1977 Directorate of Statistics and Evaluation, Bihar, pp. 84-85.
11. M.P. Pandey, "Impact of Irrigation on Rural Development (A Case Study) Concept Publishing Company, New Delhi, 1979, pp.55-56.
12. G.S. Bhalla and G.K. Chadda, op. cit, p.66.
13. D.P. Gupta and K.K. Shangeri "Agricultural Development in Punjab", Agricole Publishing Academy, New Delhi, 1980, p.5.
14. N.K. Nair, "Productivity Trends in Indian Agricultural Sector", op. cit, p.69.
15. John W. Meller, "The Economics of Growth : A Strategy for India and Developing World", Cornell University Press, Ithaca and London, 1976, p.61.
16. M.P. Pandey; The Impact of Irrigation on Rural Development, Concept, 1979, p.50. He has pointed out the dose prescribed Fertilizer Corporation of India.
17. Interview with Agriculture Officer, Naubatpur. April 1980.
18. Annual Progress Report 1978-79, Sone CADA, op. cit.
19. "Bihar Through Figures 1977", op. cit. pp.49-50. The all India average is on the basis of year 1971-72, while average for Bihar is based on the year 1974-75.
20. R.K. Sampath; "Economic Efficiency in Indian Agriculture", The Macmillan Company of India Ltd., 1979, p.65.
21. "An Appraisal of the Modern Technology, on Farm Investment, Capital Formation, Farm Productivity, Farm Income and Labour Employment 1966-67 to 1978-79"; a study done by a team consisting of Ram Iqbal Singh, Gulab Nath Singh, D.S. Sengar and B.K. Gupta, sponsored by C.S. Azad University of Agriculture and Technology, Kanpur (Memeo) Technical Report No.2, 1980, pp.31-40.
22. M.S. Swaminathan's lecture on "Our Agriculture Future" organised by the PHD chamber of commerce and Industry on January 16, 1982 at Sapru House, New Delhi. Text published in "Pioneer" dated 19 January, 1982. According to Swaminathan the productivity of paddy can be doubled the present yield. Similarly Dr. R. Seetharaman has stressed that by sound water management the productivity of paddy can be doubled or tribould (see Economic Times, Feb.9, 1982, p.10).

## CHAPTER V

### SUMMING UP

1. It has already been stressed in the introductory chapter that involvement of beneficiary farmers in the management of water below outlet level is one of the three broad objectives of CAD programme. Sone CAD agency has introduced cooperative irrigation Chak societies in its command area to achieve the goal of farmers' participation and optimum utilisation of irrigation potential. 17 such cooperative societies have been registered with the cooperative department, out of which only two (Tarwan and Karup) showed any promise. Apart from 17 societies, one unregistered cooperative irrigation Chak society (at Telpa) was also studied by us. Although Telpa was not a registered society but it was one of the few areas selected and given subsidy by the Sone CADA for OFD works. We have tried to examine the societies in terms of their structure, characteristics and composition. The role of societies has been examined in terms of participation, water distribution and repair and maintenance of infrastructure, conflict resolution, social justice and interaction with government departments and agencies. Finally, the utility of society has been judged in terms of productivity and the socio-economic grouping of the beneficiaries.

2.1 All the three organisations are almost similar in terms of their structure. Two types of bodies - executive and general are found in all irrigation farmer organisations. The executive body of a Chak society consisted of a President, a Secretary and a



Treasurer. In the two registered societies, there are four executive members each while the Telpa Chak society has a greater number of executive members, viz., eight executive members, including one ex-officio member (Assistant Director, Sone CADA, Bikram). While we look into caste-wise composition of the societies, we find that the dominant caste<sup>1</sup> of the respective village has captured the executive bodies of all the three societies. In Tarwan and Telpa it was Bhumihar and in Karup it was Koiris. Any non-Bhumihar was not given a place in the executive body in Telpa society, similarly, no non-Koiri was included in Karup society. Tarwan society is the only exception which provides one non-Bhumihar executive member.

3.1 Participation of the farmers can be judged by the meetings they hold, number of the attendees and resolutions they made in the meetings. It was found, in all the three societies, the number of the meetings so far held was largest in Tarwan (one general body meeting and four executive body meetings), next to Tarwan was the Karup society (one general body meeting and two executive body meetings) and in the third place Telpa came which held only two general body meetings.<sup>2</sup> When we consider the number of the attendees, Tarwan farmers were found less participative than those of two other societies. The meetings held in Telpa and Karup were attended by the 100 per cent members. However, it should be made clear that Tarwan society discussed important resolutions and arrived at important decisions in the meetings. In the two other societies no fruitful decisions were taken. In this way the Tarwan society members were found more participative than those of the other two societies.



3.2 As regard the mechanism of water distribution, it was found that Tarwan is the only society which came to adopt specific norms of water distribution, providing proportionate quantity and right of water to its farmers. Telpa and Karup did not adopt any specific norm for water distribution. It seemed that leaders of the other two societies were unaware of the spirit of such an organisation. Telpa leaders were only concerned with getting the OFD works done while Karup farmers had non-consolidation as the main hazard in adopting specific norm of water distribution. However, one principle which was followed by the farmers in general was 'avoiding greater loss at the cost of lesser loss'. The second reason for not adopting any norm by Karup farmers was their ignorance towards the very spirit of such societies and the necessity of set norms in this regard.

3.3 So far the maintenance and repair of irrigation structure was concerned, the similar norms have been adopted by all the three societies. Every member of all three societies were made equally responsible for the maintenance of irrigation structure. Due to non-consolidation, the member farmers of Karup society have decided to desilt the structures collectively time to time. The plans of the two societies (Tarwan and Telpa) are so made that every farmer independently can keep the channels maintained and repaired (see the maps). The norms adopted by Tarwan society was followed strictly and the secretary of the society was made, by a resolution,<sup>3</sup> responsible for maintenance and repair. On the contrary the norms are not strictly followed in other two societies. The repairs of the structures is the common responsibility of all the farmers in all the societies and every farmer is proportionally responsible. 'Proportional contribution'

to repair of the channels was adopted by the two societies (Tarwan and Telpa) but in Karup society it was found that only those farmers were responsible for proportional repair whose fields were adjacent to the channels and who benefited most. It is a fact that all the societies are in rudimentary stage and all the structures are unlined except a few ones in Tarwan Chak. The leaders of all the societies, however, expressed their desire to adopt sound norms in future (after constructions were over).

3.4 The cases of conflict resolution have also been found in the societies. Generally, mutual reconciliation and society leaders' verdict had been accepted by the agrieved parties. In case of Tarwan, group pressure and spot decisions were effective in the resolutions of conflicts. Conflicts, in Tarwan Chak area, arose out of three matters - distribution of water, drainage of extra water and maintenance of irrigation structures.<sup>4</sup> In some of the cases the President's verdict was accepted though the agrieved parties questioned the impartiality of the verdict. In two other societies (Telpa and Karup) the verdict of societies' were the mutual reconciliation among the beneficiary farmers. It has been made clear in chapter III, the two societies (Telpa and Karup) failed to reach any strict norm of water distribution and maintenance of infrastructure. As such, the decisions of the influential farmers, as was hitherto in practice, were adopted by the farmers of both the societies.

3.5 The societies have also tried to impart social justice to the weaker sections. After looking into the cases of social justice, we found that only Tarwan society has shown any promise to a tangible

extent, Telpa did it to a lesser degree (negligible) and Karup society totally failed in this regard. There were five cases of social justice in case of Tarwan; such as reallocating surplus land, exempting marginal farmers from acreage charges, keeping the plots of marginal farmers at privilege points and giving priority in sequencing of water to the marginal farmers. The fifth case of social justice was the inclusion of scheduled caste members in the society. However, it should be made clear that inclusion of scheduled caste members was just a formality done to meet the condition set by the cooperative department and Tarwan society included them only on paper. They never attended any meeting. During consolidation holdings and reallocation of plots, the Telpa society gave the surplus land to scheduled caste and backward caste members and they were also exempted from acreage charges. But what came to light was unjustified, as they were placed at the tail end area. As stressed earlier the inclusion of scheduled caste members was just a hollow principle and the leaders of Karup society had also included a scheduled caste member in the executive who died later. After his death none of the scheduled caste members was given a place in the society.

3.6 Weak and irregular contacts between officials and farmers are one of the contributing factors in poor utilisation of an irrigation system.<sup>5</sup> It was found in studied areas that the farmers' interaction with various government departments and agencies has gone up considerably and successfully in Tarwan, but the two other societies were not able to interact fruitfully. Tarwan society has made contacts with various departments and agencies such as,



head and local CAD offices, block development office, cooperative department, financial institutions including banks, rural engineering department, minor irrigation department and important higher irrigation officials,<sup>6</sup> whereas the two other societies were able to interact with only three organisations such as, local CAD authority, block development office and cooperative department and all their informal talks with the three organisations were not worth anything. The poor interaction of the two societies (Telpa and Karup) with the officials was caused by mainly two reasons - first, the leader of the Telpa society was involved in the work in the hope of a personal gain (explained in chapter III) and second, the leaders of Karup society were ignorant about the possible benefits they could gain (common as well as personal) from the government organisations.

4.1 An array of scholars have stressed that in the countries of third world the benefits of the public programmes go to the already better off farmers.<sup>7</sup> In our study, we have also investigated as to 'who are the real beneficiaries and what socio-economic groupings of the local area they represent? The data revealed that the irrigation benefits went in favour of the dominant sections of the villages. It can be judged by the fact that almost all (75.5 per cent in Tarwan and 96.7 per cent in Telpa) the land operated under OFD works are owned by the upper caste (Bhumihar) better off farmers in the two (Telpa and Tarwan) societies. In Tarwan village, 36.03 per cent (and 63.63 per cent in society) households is constituted by Bhumihars who owned an average of 1.90 acres of land per household followed by 1.87 acres per household owned by Brahmins. All backward caste households have land average of below 0.50 acres



(Yadav 0.41 acres, Mahto 0.26 acres and Gareedi 0.21 acres) in the Chak, whereas the backward and scheduled caste households constitute about 60 per cent of the village texture. Similarly Telpa village consists of 44.8 per cent (86.66 per cent in society) Bhumi-har households and they owned 96.7 per cent of land in Chak with an average of about 5.00 acres per household in the Chak.

4.2 However in two (Tarwan and Telpa) of the three studied societies the irrigation benefits went to the weaker section also. In case of Tarwan, the marginal farmers were exempted from the acreage charges and they were kept at privilege points in terms of water distribution system so that they could get water first. In the sequencing of water, it was tried by the society to distribute water first to the marginal holdings than to the small and larger holdings. As far as Telpa society is concerned, irrigation benefits did not go to the weaker sections to the extent it went to them in Tarwan, however, step was taken by the society to allocate surplus land among marginal farmers but they were kept at the tail end area.

5.1 It is a general assumption that the benefits of any step in rural areas tend us to productivity that it causes. The economic efficiency of farmers' organisation at the outlet level and the public money investments can be judged by the increase in productivity. We have measured the rise by comparing the yield rate of the chak with the outside chak area. The data revealed that the productivity of all cereals in the Tarwan Chak area was 16.18 quintals per acre compared to 13.87 quintals per acre in the land outside Chak (irrigated). In case of Telpa, the productivity of all cereals

per acre was 15.46 quintals in Chak compared to 14.90 quintals per acre in the land outside Chak. Paddy and Wheat are the major crops of the villages. The productivity of paddy rose by 21.71 per cent in Tarwan compared to 13.71 per cent in Telpa. As regards the wheat, the rise in per acre yield was 17.52 per cent in Tarwan compared to 9.58 per cent in Telpa. Over all the rise of productivity for paddy crop was marked 16.32 per cent compared to 13.17 per cent<sup>in case</sup> of wheat (see table 4.5). Of course, there has been rise in productivity in both the villages but the rise is not to an expected extent. The productivity can be brought upto double or more by introducing farm level management through community action in water and soil conservation.<sup>8</sup> The productivity of paddy in Chak area of Tarwan was 9.56 quintals per acre compared to 8.53 quintals in Telpa while the productivity of paddy in the land outside Chak (irrigated) was 8.07 quintals in Tarwan compared to 8.47 quintals in Telpa (see tables 4.4A and 4.4B). The productivity of paddy in both categories of land in the two villages is higher than the average yield rate of Bihar and India but considerably low from average yield rate of Punjab. The productivity of wheat in Chak area is higher than the all India average whereas the productivity of area outside Chak (irrigated) is lower than the all India average yield rate. The average yield rate of Bihar State is also lower than the average yield rate of India.<sup>9</sup>

5.2 One of the most immediate benefits of an irrigation provision is the scope that it offers to the cultivators for practising double or multiple cropping. Table nos. 4.8A and 4.8B revealed that the intensity of cropping in Chak area is a bit greater than non Chak

area, viz., 200.53 per cent in Chak compared to 196.85 per cent in outside Chak (irrigated) area in the village Tarwan. Similarly in Telpa also there was negligible increase in the intensity of cropping, viz., 199.25 per cent in Chak compared to 193.58 per cent in the area outside Chak (irrigated). The intensity of cropping in the studied villages was considerably higher than the intensity of cropping of whole of the Sone Command Area (165 per cent) as well as of Bihar and India.

5.3 A relevant question to ask is, whether or not these productivity gains are solely due to formation of society? The data revealed the extent of use of modern inputs is considerable in the Chak areas and has definitely been caused by the formation of the societies. The Tarwan Chak society, in particular, has coaxed its members for using high yielding variety inputs. A large percentage of farmers used high yielding variety inputs such as chemical fertilizer, HYV seeds and other bio-chemicals in Chak area of Tarwan than in the non-Chak irrigated area (see Table 4.7A). It is a well known fact that HYV inputs are better utilised in irrigated areas, hence the irrigation water has also played a significant role. The rise of productivity in Telpa is caused not solely by formation of society but the quality of land has also played a decisive role. The land on the right bank (south bank) of the main canal is more fertile compared to land on the left (northern) bank of the canal. The 'human capital component' which, according to some authors, was substantial in Indian agriculture is being availed by the farmers of the two Chak societies (Tarwan and Telpa). However, the degree of the 'human capital component' is not satisfactory.



6.1 Adding to the findings of various irrigation scholars (see chapter II), the data of our study revealed that local collective organisations have been effective in irrigation management process in terms of distribution of water, maintenance of supply structures and resolution of conflicts at the local level. Not only this, our findings also indicate that the societies could assume the role of an intermediary organisation between government departments and other outside agencies and institutions and beneficiaries. The value of organised participation by water users in management process has gone up to a tangible extent and has also been accepted by government in its various public pronouncements and policies. It would not be an exaggeration, if we say that such cooperatives can be a panacea for agricultural development. However, all the three studied societies did not get success to the same extent. Tarwan showed a considerable degree of success in terms of sequencing of water, maintenance of irrigation structures and resolution of conflicts. Apart from these, the society also successfully functioned in the spheres of interaction between officials and farmers, social justice and agricultural operations. In terms of productivity, the two societies (Tarwan and Telpa) showed promise but not to a considerable extent and much more is desirable in this respect.

6.2 The study reveals the following stages of development of such cooperatives : (i) coaxing the farmers for formation of society, voluntary consolidations and On Farm Development Works; (ii) expectation of social justice from the societies; (iii) the cooperatives are to be concerned with the distribution of water in a just way



and to facilitate its members with alternate irrigation provision at the failure of the canal system; (iv) they could take up the intermediary role between government organisations and farmers; (v) keeping watch over anarchic practices of cultivators; (vi) providing "human capital component" for better water management; and (vii) usage of HYV inputs in agriculture.

6.3 A relevant and important question hangs before us : 'what are the determinant factors which can lead a society to success or failure?' The factors which came to light during the course of our study are as follows : (i) high subsidy provided by the government or a public agency (Sone CADA); (ii) value of local leadership; (iii) knowledge of the On Farm Development Works and its benefits; (iv) frequent contacts between officials and farmers; (v) easy unanimity among the farmers; and (vi) personal interest of local officials. On the contrary, the factors leading to failure are as follows : (i) ignorance about the spirit of the society; (ii) lack of committed local leadership - leaders stooping <sup>for</sup> personal gains are no good; (iii) hasty and unforeseen step by public agency, e.g., Sone CADA's role in Karup; (iv) delay in consolidation of holdings on the part of government; (v) non-frequent interaction between officials and farmers; (vi) non coordination on the part of government or semi-government organisations; (vii) Frequent transfers of officials; and (viii) formation of irrigation farmers' organization at a premature stage.

Some of the questions and issues set in the objectives have yet to be dealt with. One such issue relates to the role of farmers' organizations at one or more levels. It must be borne

in mind that the three organizations we discussed can assure irrigation to its members only beyond the outlet level. This raises a question : should there be multitier irrigation farmer organizations to meet the main system hazards? The answer at this stage is that it would be a mere ritual to formulate these organizations at higher levels unless the organizations below the outlet are first stabilised and institutionalized. As regard the utilization of these organizations in the effective implementation of various policy decisions, there is hardly any doubt about their utility. But it has to be a two way process. The government on its part should involve local cultivators vigorously in micro level planning, designing and construction of irrigation works. If it is done, farmers are bound to help the public authorities in bringing about order syndrome in place of anarchy syndrome in irrigation systems.

Notes and References

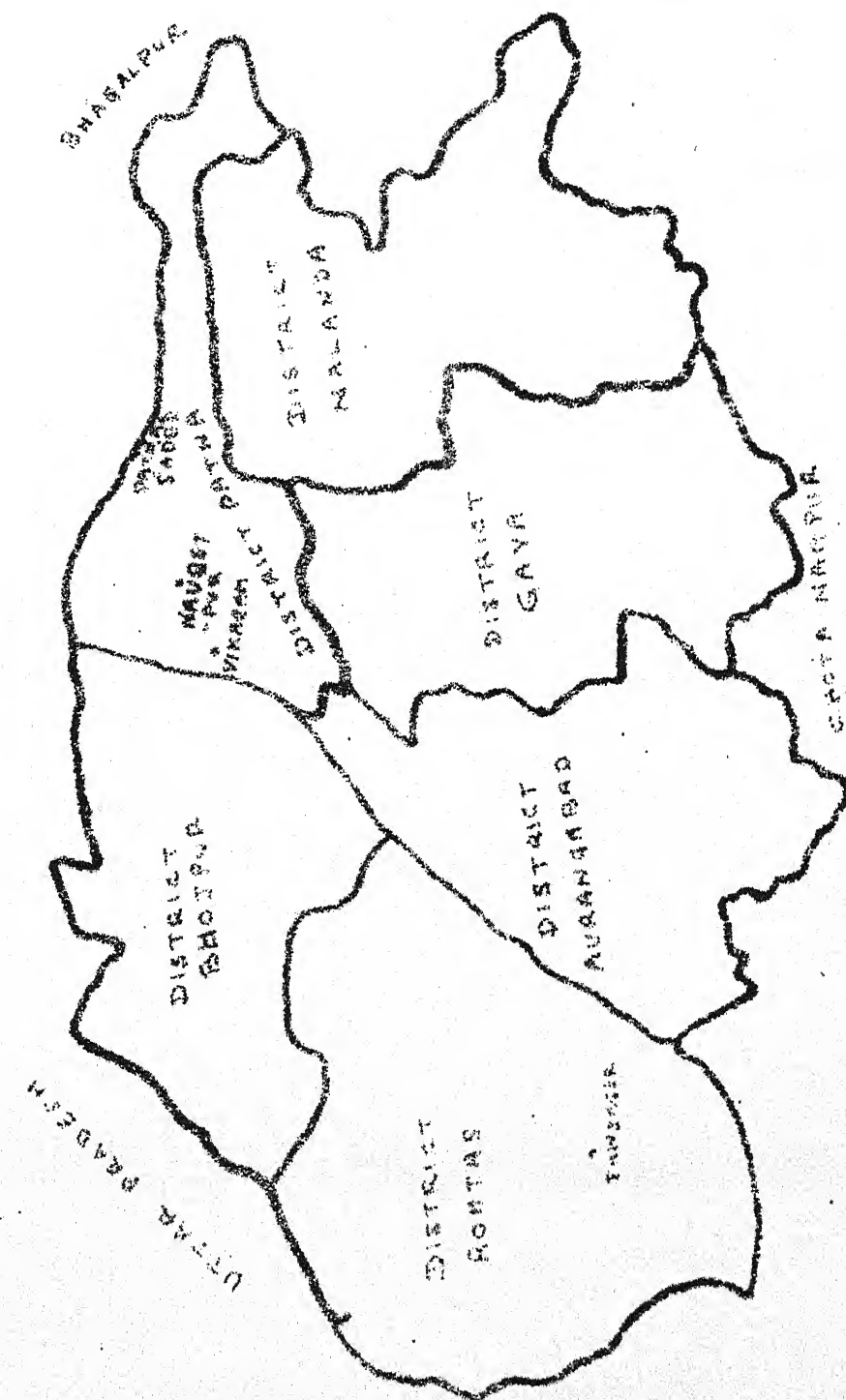
1. "The Dominant Caste Model" : According to this model, in many of India's villages exists a particular caste which possess most of the major power resources, namely : large number of caste members, high prestige primarily expressed in high ritual status; most of the land and other economic assets; a monopoly or near monopoly of influential and valued occupations; relatively advanced levels of Western Education; and occupancy of authoritative offices in both traditional - informal and modern formal local government institutions." From : Two Models of Power in Contemporary Rural Indian by John Mac Dougall in Contributions to Indian Sociology, New Series, January - June 1980, Vol.14, No.1, p.76 other references with regard to dominant caste are as follows: (i) MN Srinivas, The Dominant Caste in Rampura, American Anthropologist, 61:1-16; (ii) M.N. Srinivas, The Remembered Village, Berkeley, University of California Press, 1976. Srinivas was the first to spell out the dominant caste-model. (iii) Adrian C. Mayer, Dominant Caste in a Region of Central India, South Western Journal of Anthropology, 14:407-26. (iv) H.D. Lakshminarayan, Dominant Caste and Power Structure, Behavioural Science and Community Development, 4, 2 : 146-60.
2. However, the President of Telpa Society told that they organised several meetings but no paper was found concerning the meetings.
3. Such a resolution was made in an executive committee meeting held in August 1981. For details see Chapter III, Tarwan Co-operative Irrigation Chak Society.
4. See 'Tarwan Co-operative Irrigation Chak Society' in Chapter III.
5. A.F. Bottrall, "Comparative Study of the Management and Organisation of Irrigation Projects", The World Bank Staff Working Paper No.458. The World Bank 1818 H. Street NW Washington D.C. 20433 U.S.A., 1981.
6. For details and purposes of interaction see, Tarwan Co-operative Irrigation Chak Society, Chapter III.
7. See, R. Chambers : (i) "A Lesson for Rural Developers". The Small Farmer is a Professional". Development Digest Vol.XIX, No.3, July 1981; (ii) "Canal Irrigation Management in India : Some Areas for Action, Analysis and Research". Paper for the workshop on 'Problems and Research Methods in Irrigation Systems Related to Chak (Outlet) Requirements', held at GIS, Rajghat, Varanasi, 21-23 July 1981; (iii) Niranjan Pant, Management of Major Canal Systems in Bihar : A Kosi Case, paper presented in the workshop on "Room for Manoeuvre in Public Policy", 17-19 December 1980, IDS at University of Sussex.

8. M.S. Swaminathan's lecture on "Our Agriculture Future" in Shri Ram Memorial Lecture organised by the PHD Chamber of Commerce and Industry on January 16, 1982 at Sapru House, New Delhi. Text published in a Lucknow daily 'The Pioneer' dated 19 January 1982.
9. Indian Prime Minister, Mrs. Gandhi pointed out the low average yield rate in Bihar in the NDC meeting on March 14, 1982. She emphasized for special attention towards the states having lower yield rate. See the Pioneer, (a Lucknow daily), March 15, 1982.



SOME CONCORD ARE A DEVELOPMENT AGENCY PATENT

Map of Patna Division Showing Operational area of some CADA

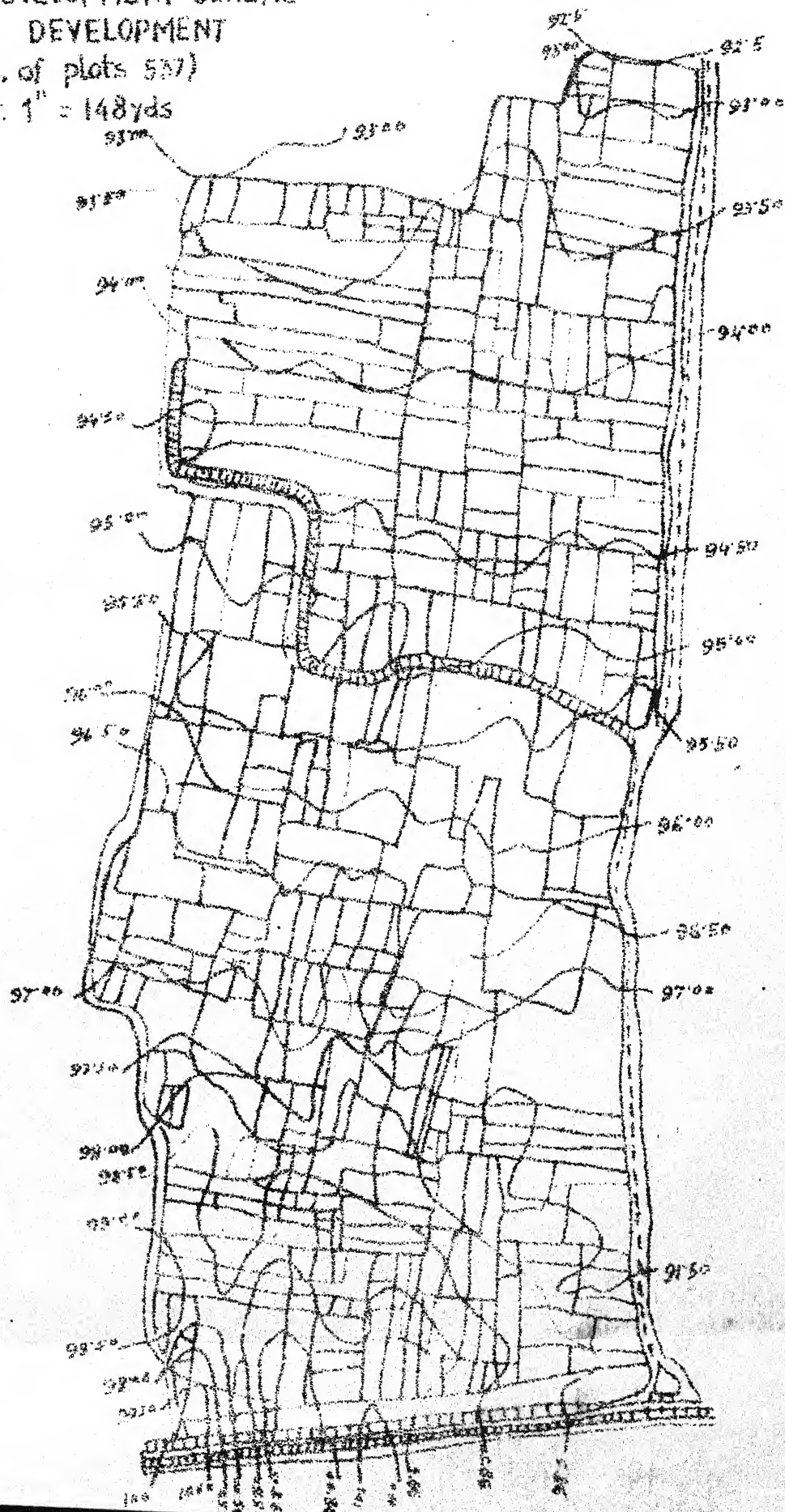


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AREA DEVELOPMENT SCHEME  
BEFORE DEVELOPMENT  
(Total no. of plots 537)  
Scale : 1" = 148yds

BEFORE DEVELOPMENT

Scale: 1" = 148 yds

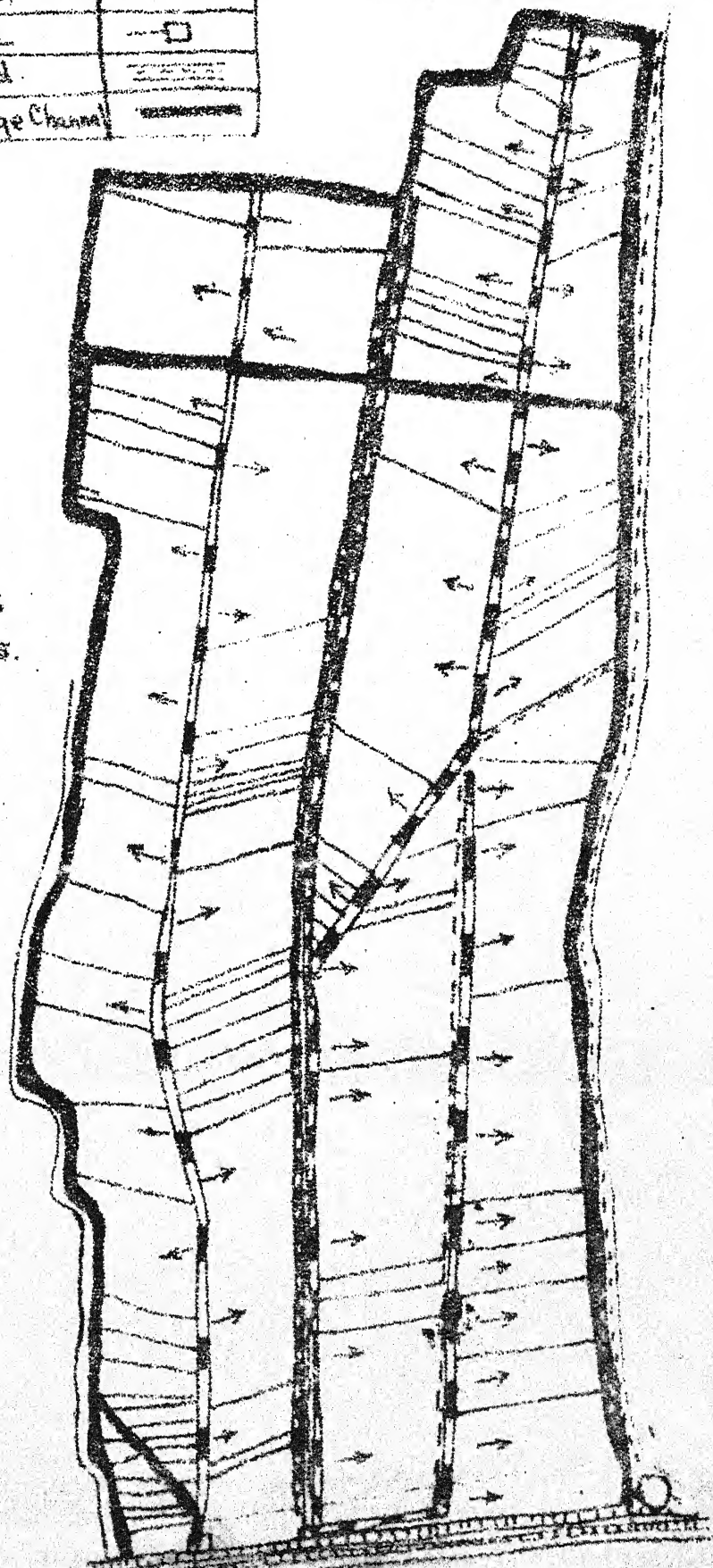


1	Distributory.	
2	Irrigation Channel.	
3	Drainage Channel.	
4	Farm Road.	
5	Outlet O/L.	
6	Village Road.	
7	Main Drainage Channel.	

AREA DEVELOPMENT SCHEME -  
AFTER DEVELOPMENT  
(Tarwan circle Noubalpur  
district. Palno)  
(Total no. of plots 108)

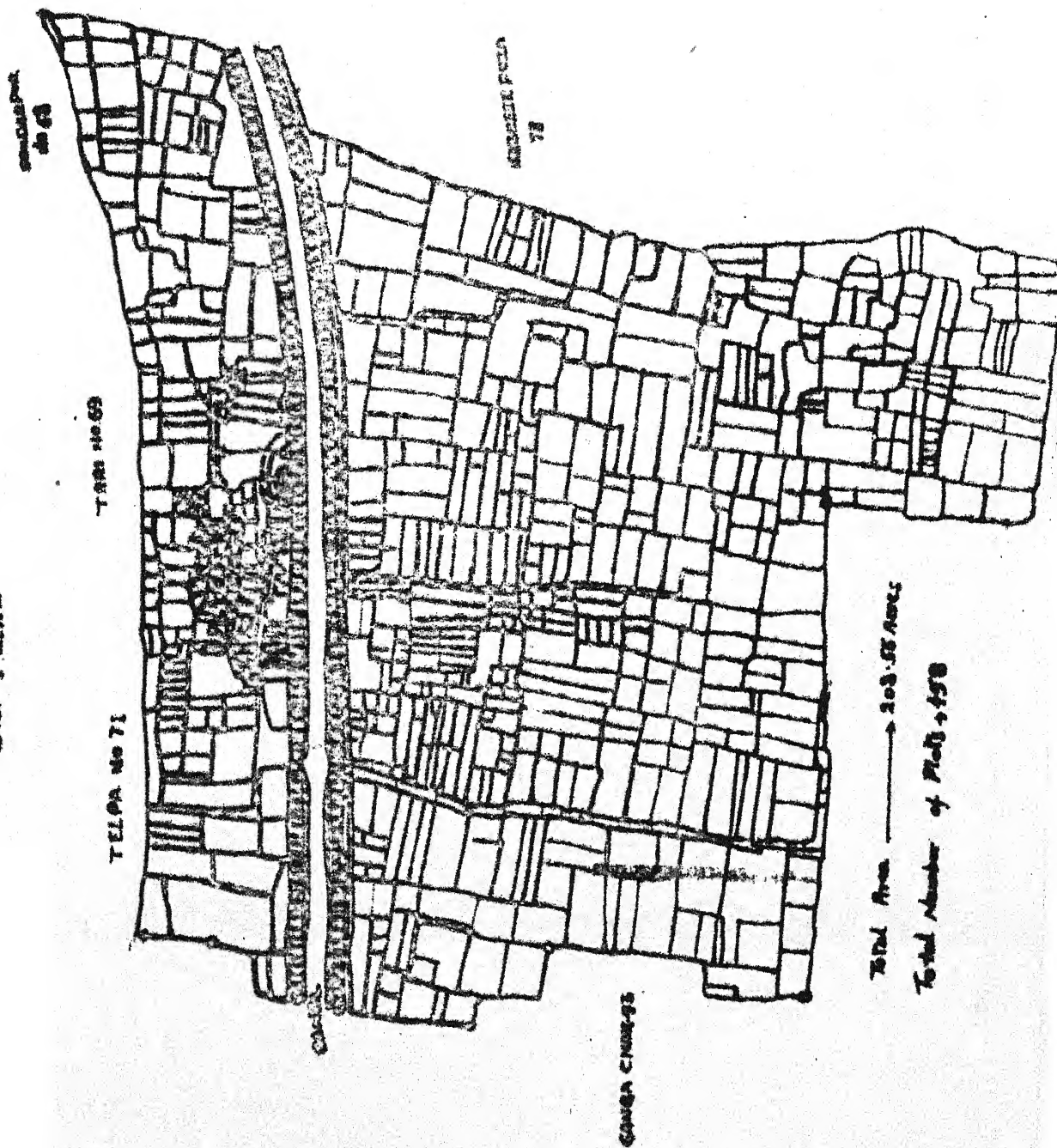


Total area 127 acres  
Scale: 1" = 148 yds.





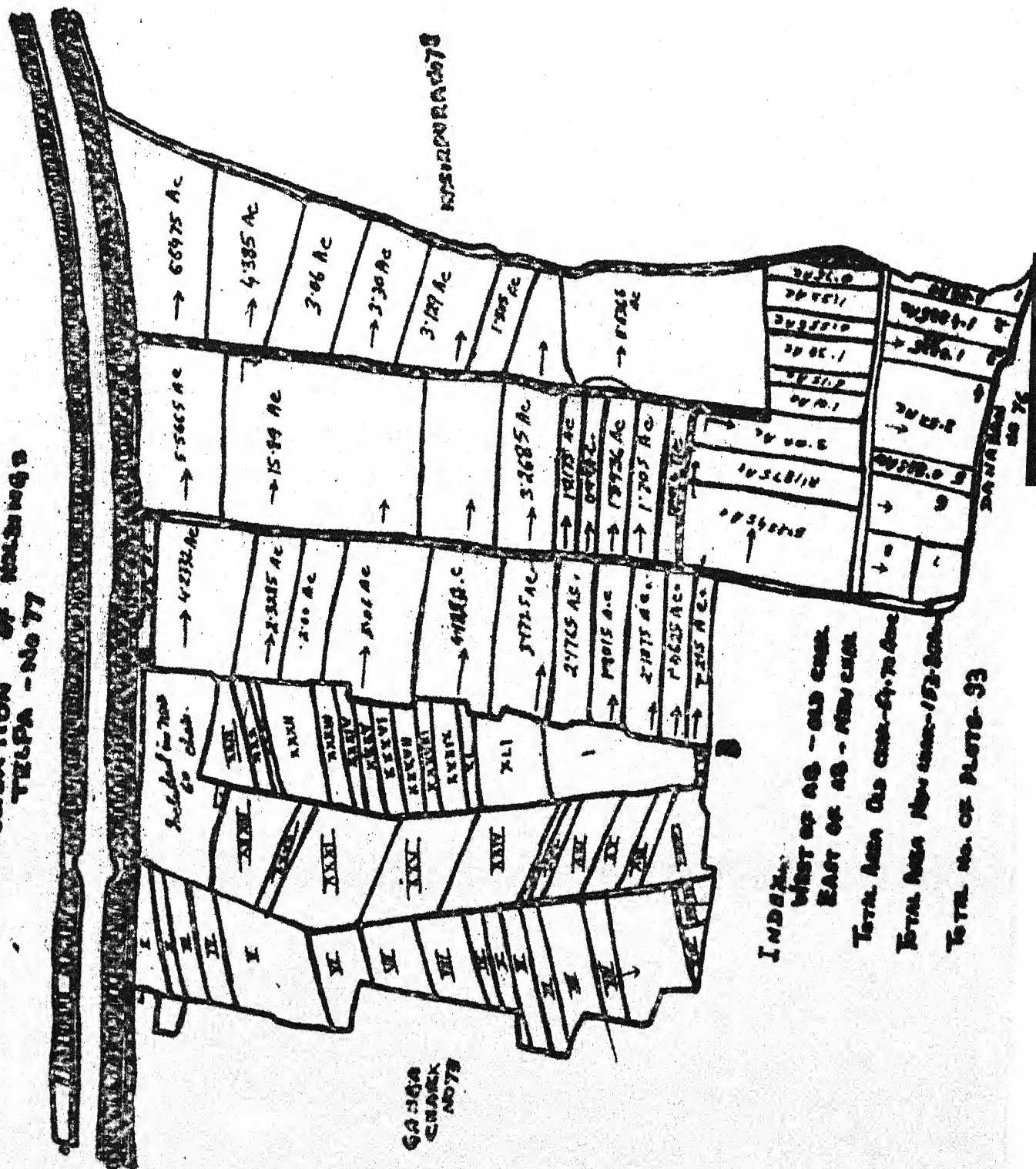
Map-4  
 Jajga (Muzenda) Before Consolidation  
 Block Sakram  
 Dist Patna



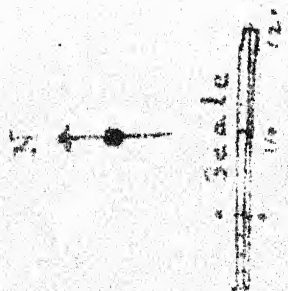
Total Area → 203.55 Acres  
 Total Number of Plots → 458



AFTER CONSOLIDATION OF MATINGS  
 TELPA - No 77



ON RAIN DEVELOPMENT. SCHEME  
 VILLAGE KARUP, BLOCK SHIVSAGAR, DISTRICT RAIPUR  
 Total Area. 245 Acres No. of Paddies 1075  
 Before the Plan.



Scale

Distributory & Field channel

Drainage channel

Crank Road

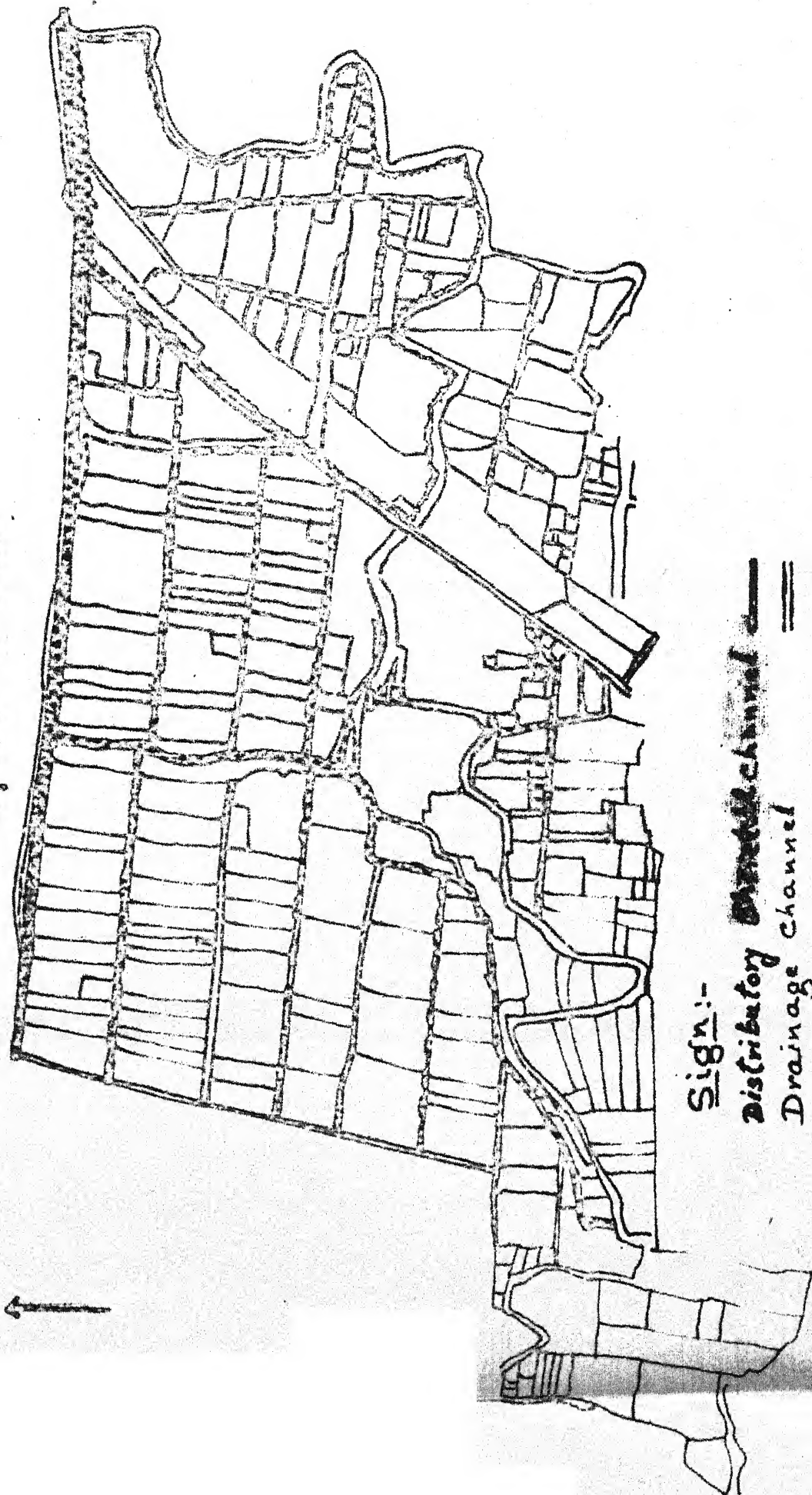
# MAP-3

ON FARM DEVELOPMENT SCHEME

VILLAGE KARUP BLOCK SHIVASAGAR DISTRICT ROYAL

TOTAL AREA 2400 NO. OF PLOTS 100

After the Plan



Sign:-

Distributory channel

Drainage channel

O.F.D Work done